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Contractors and Engineers Monthly

Vol. 43, No. 8 AUGUST, 1946 $3 a Year, 25 Cents a Copy

Covering the Field

• Bridge Construction

The feature of the substructure for the new Victory Bridge in Washington, D. C., is the method of excavating for the piers through open wells in caissons sunk by dredging. See page 1.

The design of a new 300-foot concrete bridge indicated that its construction should be simple enough. But the lumber shortage and bad weather provided plenty of problems. See page 48.

• Airport Paving

The methods and equipment used for concrete-paving a new runway are described in text on page 1 and in pictures on pages 42 and 43.

• Highway Grading

On the relocation of 2.8 miles of winding main highway, the contractor used tractor-scrapers to cut down the hillside for the new route. See page 2.

The problem on a 3.6-mile road-improvement was blasting directly beneath a vital power line. See page 33 for job details.

For a 6.9-mile grading contract for a new post-war highway, the contractor used a new type of loader to speed up moving 1,176,465 yards of dirt. See page 76.

• Beach-Erosion Control

A fight against beach erosion is going on in most coastal states. The control program in one state, and a typical dredging contract, are described on page 6.

• Highway Maintenance

The use of mud-pumping, bituminous under-sealing, and a mechanical jack to correct pumping at joints in rigid pavements is described on page 11.

• Safety on the Job

For greater safety in construction, see page 27 for hints on an easily built first-aid station, proper equipment, and preparations to handle job emergencies.

• County Road Work

County organization, the road program, care of equipment, an asphalt plant, and the production of aggregate for road work are described on page 35.

• Plant-Mix Surfacing

Patching and widening preceded the work of laying a bituminous-concrete surface on 7.4 miles of U. S. 40. See page 45.

• Levee Construction

Both draglines and tractor-scrapers were used to move 500,000 yards of dirt for new levee. Rain and mud were the major job problems. See page 51.

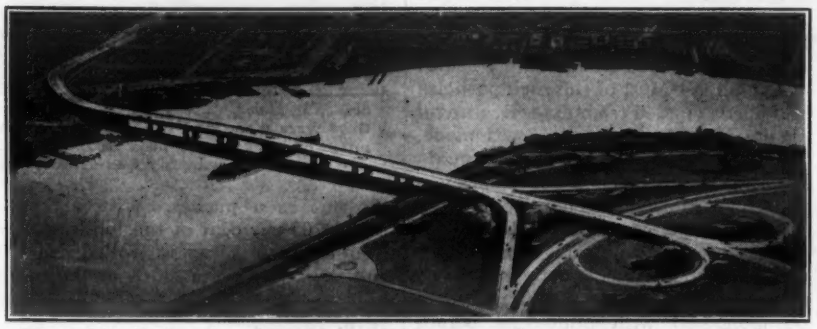
• Roadside-Slope Seeding

Shoulder stabilization with calcium chloride and slag screenings, and the seeding and mulching of roadside slopes were included in an 8-mile highway contract. See page 59 for the methods used.

• Dredge Repair Base

Both dredgemen and equipment-shop superintendents should find helpful the article on a dredge repair base on page 64.

(You will find "In This Issue" on page 4)



The architect's drawing of the Victory Bridge now under construction over the Anacostia River, Washington, D. C.

Bridge Substructure Is Built With Caissons

Excavation Through Open Wells; Caissons Sunk by Dredging; Concrete Poured As Sinking Progresses

By WILLIAM H. QUIRK, Editor and Eastern Field Editor

✦ ONE of the first big post-war projects is the construction of the substructure for the new Victory Bridge over the Anacostia River at Washington, D. C. It is now being vigorously pushed to completion by the Dravo Corp. of Pittsburgh under contract to the District of Columbia. Work on the $2,487,590 contract started early in 1946. The substructure will be ready for the steel superstructure by the middle of next year. The latter work will probably take a year, so the bridge should be open to traffic in 1948. It is different from the many other bridges in the nation's capital spanning either the Potomac or Anacostia Rivers. All of these are supported on piles or rock. The new piers, however, rest on caissons, the deepest having a founding level of minus 90.

Nine caissons are being sunk to position by dredging through their open dredge wells. A series of concrete pours are made as the sinking progresses. These fill the area between the cylindrical wells and the outer skin of the caisson. When the caissons are sunk to founding level and sealed, distributing blocks are constructed on top of them. These distribute the load over the dredging wells, and in turn support the pier stems.

The Victory Bridge is to carry highway traffic across the Anacostia River from the foot of South Capitol Street to a point near the Naval Air Station on the opposite shore. The span over water will be 1,298 feet. It will comprise a centrally located girder swing span having a total length of 386 feet between rest piers, and flanked on each side by three 152-foot cantilever-type girder spans. The Anacostia is already crossed by three highway bridges at Benning Road, Pennsylvania Avenue, and 11th Street. All are located above the Washington Navy Yard which lies on the right bank of the river. The new bridge is below the Navy Yard, thus requiring the contractor to maintain free and unobstructed river navigation.

(Continued on page 20)

DIRT LOADER SPEEDS GRADING JOB

C. & E. M. Photo

On its contract for grading 6.9 miles of the Shirley Memorial Highway in Virginia, Nello L. Teer Co. used a Euclid loader. It filled 20-ton buttom-dump Euclids with 17 cubic yards, loose measurement, of dirt in 30 to 40 seconds. See page 76.

Concrete Paving For New Runway

Slabs Rest on a 6-Inch Pervious-Gravel Blanket; Equipment Speeded Work At Denton, Texas, Airport

By RAYMOND P. DAY, Western Field Editor

(See photos on pages 42 and 43)

✦ CONCEIVED in war for the days of peace, a new municipal airport for the northern Texas city of Denton was recently completed. Denton now has an unusually well built airport ground system for a city of its size. It includes one north-south runway 4,150 feet long x 150 feet wide of 8-7-8 concrete, with 500 feet of 8-inch concrete at each end; and two 50-foot-wide concrete taxiways, with grading and sod on the shoulders. One of the taxiways is 4,900 feet long, the other 500 feet; and both are of 8-inch concrete.

The project is part of the comprehensive development of our country's air facilities by the Civil Aeronautics Administration. The job was designed and supervised by the Fort Worth office of that agency. Field work was done by Farrell Contracting Co. of Dallas, which held a $224,755 contract for all grading and earth work. Concrete paving was let to the Austin Road Co. of Dallas for $190,050. The City of Denton furnished the flat 504-acre tract upon which the new airport is located, about 3½ miles southwest of the city. It also agreed to maintain the field and runways after construction work was finished and turned over by the Civil Aeronautics Administration to the municipality.

Earth Work

The principal bid item in the Farrell contract was 310,000 cubic yards of unclassified excavation. Low bid on it was $0.375 per cubic yard. It was this item which caused concern when rain fell, for the soil was mostly heavy clay laden with organic matter. When it was wet it balled up like wet snow. Rubber-mounted earth-moving equipment skidded and slipped. Then, when pusher tractors were used to help load Carryalls or Tournapulls to capacity, the wet muck lumped together and dumped hard.

Four 12-cubic-yard Super C Tournapulls were used on excavation, along with two LeTourneau 12-yard Carryalls drawn by Caterpillar D8 tractors. Two Koehring 10-yard wagons were also used on part of this work. Hauling distance from borrow pit to dump was kept under 1,500 feet. But so much rain fell while the borrow pits were opened up that conditions under the equipment were not very favorable. Work began on dirt-moving May 1, 1945, and proceeded as rapidly as possible under the circumstances. A completion date of

(Continued on page 70)

Heavy Dirt-Moving For New Alignment

Mountainsides Cut Away By Tractor-Scrapers to Eliminate Unsafe 3-Mile Stretch; Some Job Problems

✦ FOR years the crooked, winding section of U. S. 99, southeast of Redlands, Calif., has been a menace. Its original alignment followed the best practice of another day. But since then, road-building machines and methods have improved. Automobiles, too, have improved, but still the old road with its winding curves has lain dormant, like a coiled snake ready to strike.

On January 21 of this year, the California Division of Highways let a $309,541 contract to Matich Brothers of Colton, Calif., for the realignment of this awful 2.8 miles. The contract also called for conversion of the old highway to a modern 4-lane freeway with a median strip. The project, which has been high on the priority list, is one of the first jobs to be let during the post-war construction period with Federal-Aid funds. Its completion will end the menace on that particular length of highway.

This 3-mile section has been hazardous for several reasons. It extended from the top of a hilly pass down towards Redlands, a thriving city of 15,000 people. At the bottom of the grade and near the worst curve of all, stood the Redlands high school. Its children were almost daily exposed to danger as they crossed the heavily traveled route. Sometimes a vegetable truck with faulty brakes would get out of control on the curving grade, and smash itself to pieces below. The high school was so endangered more than once.

Just a few weeks before the reconstruction of this section began, radio star Garry Breckner lost his life there. Traveling fast, he was on his way in from Palm Springs to make his regular broadcast from Hollywood's Radio City, as master of ceremonies on the Breakfast Club program. His automobile crashed into a palm tree near the high school.

As traffic accidents mounted on that stretch of road, highway patrolmen came to call it, with grim realism, "the last three miles".

The Grim Reaper was apparently not going to give up without a struggle. Mother Nature seemed to be working in cahoots with him to thwart the new alignment. Heavy cuts and some deep fills were necessary before the new highway could be a reality rather than a mere design. With the job about 30 per cent complete at the time it was visited for CONTRACTORS AND ENGINEERS MONTHLY, Matich Brothers had already encountered tough excavating in the cuts.

Grading Operations

Cut formations more than 20 feet deep resolved themselves into a more or less typical cross section. About 8 feet of clay soil, covered by grass and mountain shrubs, lay on top. Next came a layer of conglomerate, with particles ranging from sand to boulders 7 inches in diameter. Most of the rock particles had been rounded from extensive travel at the time the formation was made. This conglomerate layer was approximately 10 feet thick. Below that level, it seemed to change generally to sand. So the new highway was established on pretty much that material as a base.

Most of the new cut sections were so steep and inaccessible that they had to be pioneered with bulldozers before other earth-moving equipment could work to advantage. Three Caterpillar D8 tractors were brought in for this preliminary work. They outlined the top of the slope, pioneered a cut, and built haul roads for earth-moving scrapers. Three LeTourneau 30-cubic-yard Carryalls were brought in and hooked to the D8's after they had finished with their bulldozing.

A Wooldridge 25-cubic-yard scraper was also brought in with a D8 Caterpillar in the lead. A D8 was used in the cut as a pusher. With approximately 65 per cent of the job in a new location, the scrapers rolled 100,100 cubic yards off the sides of the steep hills, at a contract price of 38 cents per yard.

Matich Brothers has in its employ a hard-bitten character named Pete Bellezza. Pete has worked long and faithfully at his job. He is equally adept with bulldozer and scraper; it makes him no never-mind. Day after day Pete pioneered with a dozer, or hooked up to a "pan" and moved dirt.

C. & E. M. Photo
Cuts were many and deep on the Matich Brothers contract for the realignment of 3 miles of Highway 99 near Redlands, Calif. Labor was so scarce that all the 1 to 1 backsloping was done by this new Caterpillar motor grader.

C. & E. M. Photo
A Caterpillar D8 and LeTourneau Carryall work in a cut section on the Matich Brothers 3-mile highway realignment contract.

C. & E. M. Photo
Laborers install corrugated-metal pipe drains along the road on the Matich Brothers job for realigning a 3-mile section of Highway 99 in California.

Dozer Hookup

Pete noticed invariably that when he hooked a scraper onto his D8, the rigging was different and his cables seemed to spool better and last much longer. He searched and searched for the reason. Theoretically, at least, the bulldozer cable should have lasted longer, because the lead-in was straight—a line from the top of the LeTourneau frame down to the right-hand drum of the power-control unit. After some study of the situation, Pete's curiosity was aroused. For hour upon hour as he worked, he looked down at his power take-off drums, searching for the solution. When it came, Pete saw how amazingly simple it was. So long as he was hooked to a scraper, the lead-in fed through a sheave which was mounted on a swivel just before it got to the drum. This swivel permitted the cable to spool evenly. On the short, straight-down bulldozer lead-in, the cable climbed and crushed.

"Why not come down through the bottom sheave and back up through and over this swivel-mounted sheave with our lead-ins when we're hooked to a 'dozer?" Pete wondered. "The same as we do when we're hooked on to a scraper."

Pete's operator companions argued that such rigging would put a reverse bend in the lead-in.

"It's got it in there when we're hooked to a scraper," Pete insisted stubbornly. "We're using damn good wire rope, and I believe it will stand reverse bending better than crushing. I'm going to try."

Pete rigged his machine that way the next time he picked up a bulldozer blade. His homespun theory proved right. His cable lasted much longer, and he found that when it led down through the swivel-mounted sheave, spooling characteristics were good. Pete's system will work on any LeTourneau double-drum power-control unit controlling a bulldozer blade. Matich Brothers used 6 x 19 preformed plow steel-wire rope, with a wire-rope center, generally in sizes from 9/16 to ⅝-inch diameter. Although preformed rope is made to stand more abuse than ordinary rope, Pete's system will lengthen rope life regardless of which type is employed.

Kept Borrow Wet

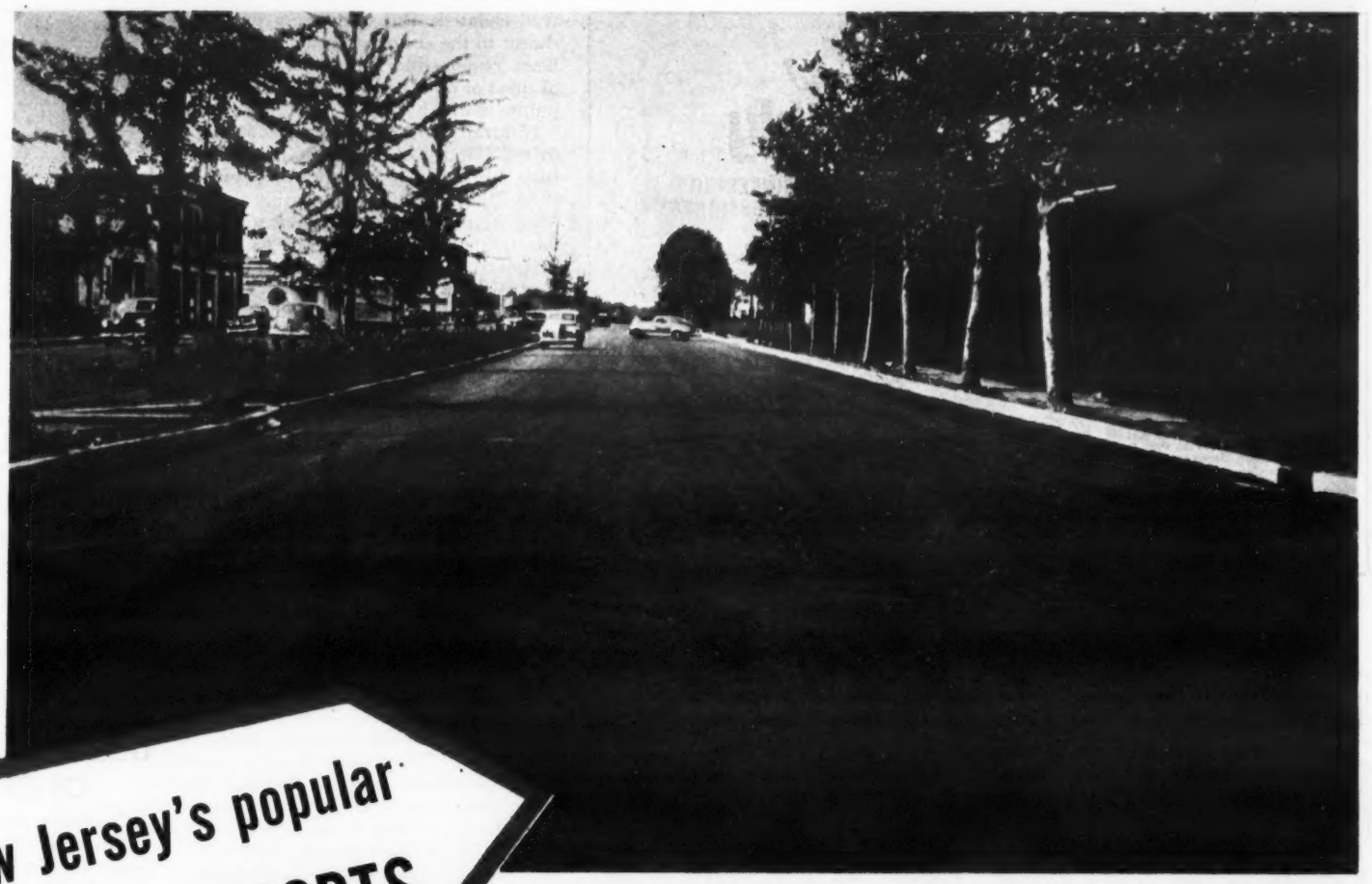
Another job angle to make excavation easier was rigged up by Matich Brothers. The borrow area was watered ahead of the earth-moving machines. But a great deal of the steep borrow was not accessible for water trucks. So Matich mechanics got busy and built a special water-tank truck in the company yard. The tank's spray reached about 60 feet on each side of the truck.

The spray bar behind the truck is mounted with watertight swivels 5 feet from each end. The spray bar can be widened to its full 16 feet by turning the two 5-foot sections at right angles to the truck tank. Or the swiveled, watertight joints can be turned around behind the truck, concentrating water on a strip only as wide as the truck itself.

In addition, a powerful vacuum-operated valve, controlling a perforated nozzle, was mounted above the spray bar. Its control is independent of all others. This special nozzle can be used in those inaccessible places on the sides of cuts higher than the haul road. Or it will direct a flood of spray as far out as 60 feet from the side of the truck. By watering the borrow area with this and two other tank trucks, Matich Brothers guaranteed that the material would excavate easily.

At the foot of the grade, where a particularly dangerous curve had once existed, Matich Brothers cut a new route through an orange orchard. About 1,500 trees had to be removed. They were pulled up by the roots by Caterpillar D8's, except in a few instances where it was more desirable to use a Lorain 75 dragline. This dragline, later on in the job, was fitted with a shovel and dipper stick. It loaded

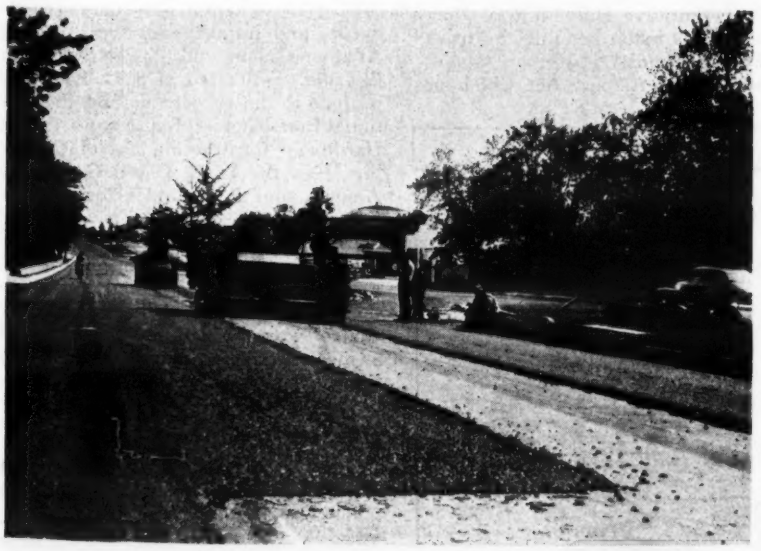
(*Continued on page 15, Col. 4*)



Newly completed Cold-laid Texaco Asphaltic Concrete pavement on State Highway 4N through Deal, N. J. Constructed by the Marsellis-Warner Co. of Montclair, N. J.

To New Jersey's popular SEASHORE RESORTS

New Cold-laid Texaco Asphaltic Concrete pavement provides a resilient, durable, inviting riding surface



Laying the first of two 1½ inch courses of Cold-laid Texaco Asphaltic Concrete on New Jersey State Route 4N. Texas No. 96 Paving Cement was used in the mix.

New Jersey's State Route 4N skirts the Atlantic Ocean and serves motorists bound for the string of popular resorts on the north Jersey coast. Repaving the section of 4N through Deal, N.J., was given a high priority among the State Highway Department's post-war projects.

A plant-mixed Texaco Asphaltic Concrete pavement of the Cold-laid type has been constructed on this important State Highway. The pavement was laid in two courses, each 1½ inches thick. The resilient, joint-free, skid-resistant qualities of this type of construction insure years of smooth, safe driving and a low upkeep cost.

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TEXACO ASPHALT

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Muddling Through

The construction industry, like the rest of the country, has muddled through the first full year of peace since the shooting war ceased in August a year ago. Unfortunately the muddling seems to give no sign of abating, and the much needed construction that was expected to be done in 1946 has fallen far short of expectations. In the meantime nearly all parts of the country are desperately in want of long overdue public works such as roads, bridges, grade-crossing eliminations, flood-control projects, and similar improvements.

Communities subject to flooding are not getting protection against a possible disaster that may strike unexpectedly at any time. In the highway field the picture is particularly appalling. New road construction has not kept pace with even the limited production of new cars, much less the return to service of many that were laid away during the gas-rationing era. Obsolete roads, their rough, bumpy, washboard pavements dangerously overcrowded, have not been widened, nor have sharp curves been removed. Old risky bridges stand shakily awaiting replacement. All too often, railroads are still crossing highways at grade.

Why are not more contractors engaged in this essential job of serving the public through the medium of the various state and county highway departments and governmental agencies? One cannot generalize safely nor state exactly what causes this bottleneck in construction. Conditions vary widely in different parts of the country, even within the same region. In the deep south, for instance, one state reports the birth, since the first of the year, of fifty new construction firms ready and eager to bid on highway contracts. Another state in this same locality has been advertising and readvertising jobs, with no bidders interested. Some other states in the south, east, and midwest have rejected bids on many projects when the figures submitted exceeded the estimates by a considerable margin.

In the west the overall picture is brighter. Though contractors still have to work with old worn-out equipment, their bids are surprisingly low. Contracts for two big dams were recently awarded on the basis of pre-war prices, cut back from even present-day levels. Great western syndicates have managed to shave construction costs considerably. They have also kept their margin of profit low, thereby giving taxpayers the welcome break of getting important public works done at a bargain rate.

But a situation worth noting has been observed in one industrial section of the country. Flood-control projects there have gone begging for lack of bidders. Contractors were apathetic, or else entered bids that were as much as 100 per cent over the estimate, in spite of the fact that estimates on these jobs were based on current prices with a liberal profit included. Mutterings about guaranteed profits and the security of "cost-plus" payments have even been heard in some instances where the contractor has obviously been spoiled by the generous pickings of war contracts.

Such talk is dangerous to the contractors themselves, as a little reflection will convince. Their welfare and success depends on the continuance of the contract system, with award of jobs to the lowest responsible bidder. It is the fairest and most economical way of awarding work and spending the taxpayers' money, to say nothing of protecting the system of free enterprise. Negotiated contracts, with their potential concomitants of favoritism, graft, chicanery, and waste of public funds, can only result in less construction. This would be a deadly boomerang to contractors.

One southern city, a firm believer in the contract system, was compelled this spring to do some sewer and drainage work itself, by force account and rented equipment, when bids on this very essential work soared beyond reason. Such is a step to which governmental agencies may resort if contractors cannot be found to undertake projects. Cases of this sort are still few and fairly well isolated. But they are a potential threat to the contract system which has been responsible for the construction of most of our roads, bridges, and other public works.

Naturally no one expects a contractor to bid blindly or take a job where he feels he will lose money. Bidding in these times is fraught with concern over the market outlook for equipment, labor, and materials, and the great uncertainty over prices. Even with price controls, contractors could not tell from day to day what prices to quote in their estimates when they were trying to get a contract. Government agencies with jobs to be done may have to make provision for this state of affairs. They may have to work out some system of flexible adjustments with contract payments, should a rising price index indicate a marked increase in bid prices before the completion of a contract.

If agencies awarding contracts adopt a realistic day-to-day attitude as much as possible—if they base estimates not on what it cost to do a job a few months or a few years back, but on actual present-day prices—they will no doubt find their jobs readily sought after by contractors. Estimators will have to keep abreast of the times. They must keep their fingers on the economic pulse of the nation if they are to observe trends and fluctuations and act intelligently when preparing their unit-cost figures.

In the meantime, careful bidding by the contractor, with an eye to all possibilities but yet not without some daring, seems to be in order. Venture capital means exactly what the adjective implies, and the conditions that surround its use are very seldom absolutely perfect. An intelligent and courageous employment of it on the part of our contractors will speed the highway and public-works program on its way.

Funds Are Available Now for Large Airports

Construction of airports to serve the larger metropolitan centers of the nation can go on with Federal Aid this year, reports Walter R. Macatee, Manager of the Airport Division of the American Road Builders' Association. The passage of H.R. 6741, introduced by Representative Bulwinkle of North Carolina, has made possible the use of the Federal funds.

The Federal Airport Act which became a law May 13 provides that to undertake work on Class IV airports or larger, the Civil Aeronautics Administration must get authority from Congress at least 60 days before the close of the fiscal year. Since the 1946 fiscal year closed June 30, there were not 60 days after the Act became law in which to secure the necessary authority. Things looked bad until Mr. Bulwinkle's bill was passed. The measure provides temporary suspension of the 60-day clause.

LET'S GET THE BALL ROLLING!

USED Lets $91,000,000 Of Civil-Works Jobs

Contracts for more than $91,000,000 worth of civil works were let by the Army Engineers between V-J Day and June 1, 1946. This statement by the War Department is based on figures released by Lieut. Gen. Raymond E. Wheeler, Chief of Engineers. Invitations are out for bids on several more projects, and a greatly enlarged program is planned for the current fiscal year. This is all heavy construction.

In the year following V-J Day, the Corps awarded 334 contracts for rivers and harbors and flood-control projects. These jobs were scattered over 39 states, and range from solitary projects in some states to 74 in Louisiana. Oklahoma, which received more than $21,000,000, leads in the monetary value of contracts let.

During the period, the largest individual contract awarded was for initiating construction of a dam, powerhouse, and appurtenant works at the Allatoona Dam and Power Project in Georgia. Estimated at $13,281,888, this project is under contract by the National Constructors, Inc., comprising the Hardaway Contracting Co. of Columbus, Ga., the L. E. Dixon Co. of Los Angeles, and the Arundel Corp. of Baltimore, Md.

During the current fiscal year, $308,845,250 becomes available to the Army Engineers by Congressional appropriation for rivers and harbors and flood-control work. Much new work as well as increased construction on some of the larger projects is planned.

He Hired Carpenters, Not a Camel Caravan

A construction strike of an unusual nature occurred recently at Cambridge, Mass. A carpenter "walked off" a large apartment-erection project, followed by his fellow carpenters, bricklayers, plasterers, etc. The reason: he wanted a drink of water.

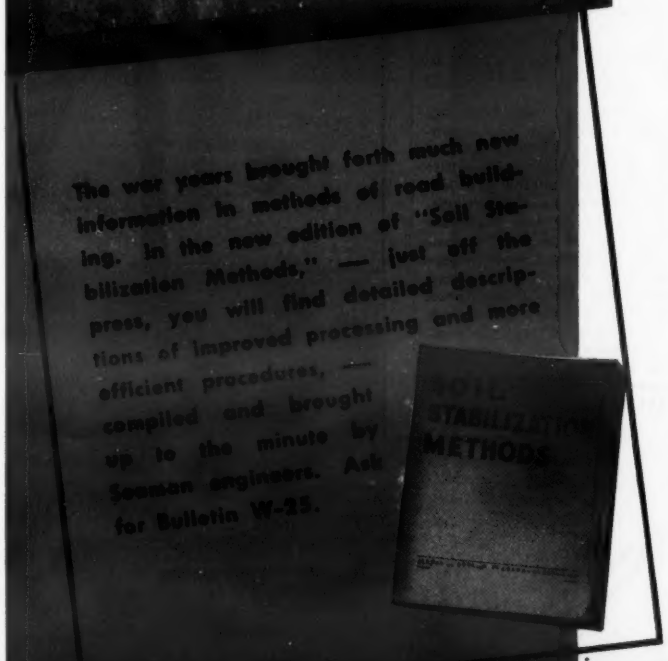
Under Massachusetts law, the "use of the common drinking cup, glass, or dipper is prohibited and the employer must furnish, without cost to the employees, individual single-service paper drinking cups". Our carpenter found only an old-fashioned pail and dipper when he sought to quench his thirst. And the dipper was rusted! So he walked out.

The builder hurriedly supplied the necessary drinking facilities to maintain his workers' health. Incidentally, under Massachusetts law an employer may be fined $100 per violation per man.

33 WISCONSIN COUNTIES

Do Their Road Mixing

WITH THE SEAMAN


The war years brought forth much new information in methods of road building. In the new edition of "Soil Stabilization Methods," — just off the press, you will find detailed descriptions of improved processing and more efficient procedures, — compiled and brought up to the minute by Seaman engineers. Ask for Bulletin W-25.
SOIL STABILIZATION METHODS

ROAD making problems in the great state of Wisconsin are many, — for aggregates vary considerably as does terrain and soil. Weather is often temperamental and at best the construction season is short. But there is one unit of equipment which county highway engineers find best for every road-mixing problem, — the SEAMAN MIXER . . . In bituminous construction of every type, — the SEAMAN produces a complete and uniform coating of aggregate, — a more intimate and better controlled mix in markedly less time. The SEAMAN saves astonishingly in the amount of oil required . . . Especially where aggregate is spread flat, — and only the SEAMAN used for mixing, — output is increased as much as 2½ times over the windrow method. And, — speaking of inclement weather, — in temperatures as low as 35° F., — the SEAMAN has produced a superior mix with excellent control of voids. That's why it's the choice of 33 Wisconsin Counties, — (several have 2 SEAMAN units) with more coming in right along.

SEAMAN MOTORS
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The **SEAMAN MIXER**

State Fights Beach Erosion

Post-War Program Under Way on Long Island Seacoast

Barrier Reef Is Built Up By Dredging and Jetties With Methods Varying to Suit Particular Problems

✦ SERIOUS beach erosion has been occurring along the south shore of New York State's Long Island, where the waves of the Atlantic buffet against 120 miles of coast. So with appropriate vigor, the New York State Department of Public Works, in conjunction with the Long Island State Park Commission, has set out to combat the ocean. Definite progress is being made, not only in arresting the loss of large sections of shore line, but also in building up areas previously badly eroded. This large post-war program got under way this spring with the awarding of several contracts. These were for both dredging and jetty construction, depending on which method was better for the particular stretch of coast in need of improvement.

The accompanying article describes a typical dredging contract. It was one of several included in this program. By it, the ocean-front beach, heavily eroded by severe storms, was built up by "artificial nourishment". This consists of sand hydraulically pumped from the bay which lies sheltered behind the low-lying barrier reef. A later article will cover the preservation and restoration of beach front through accretion; stone jetties were constructed at Long Beach, where conditions were not suitable for dredging. Another future article will cover the dredging of a new and more desirable navigation channel in Fire Island Inlet. There the excavated material was pumped through floating and submerged pipe lines to discharge finally on the ocean side of Oak Beach, where the swift current had been steadily eating away the shore.

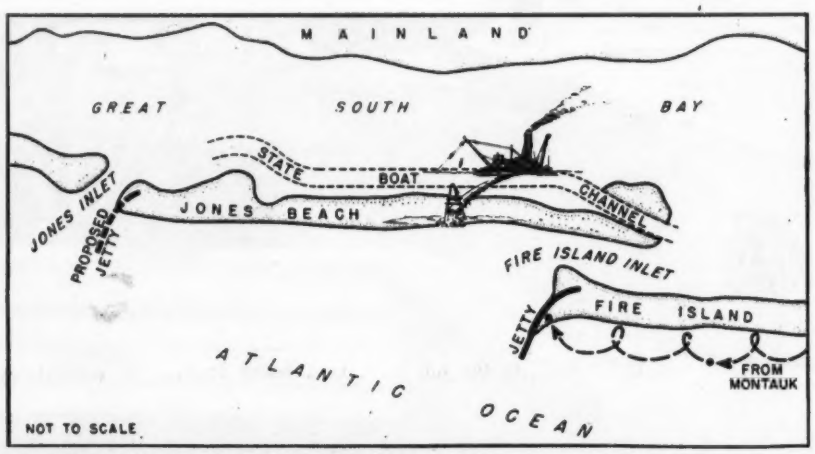
Sands of Time

Erosion is nothing new to the island shaped like a fish. The swirling, shifting sands of the south-shore beaches are in constant migration from east to west as the wave-generated currents carry them along the coast. Moving from Montauk Point, the easterly tip of Long Island, the coarse, gravelly sand is ground to the gradation of fine sugar by the time it reaches Rockaway Inlet at the west end. The north shore fronts on comparatively quiet Long Island Sound, so it has a fairly stabilized periphery. But the south-shore outline is continually being changed by the turbulent Atlantic. For instance, Fire Island records of the past 111 years show that this barrier beach or reef front containing the Great South Bay has pushed west for over 4 miles. It was finally checked in 1940 when the Army constructed a mile-long rock breakwater extending out into the ocean. Since then sand has gradually accumulated on the east side of the breakwater, arresting a march that threatened to overlap the entire Jones Beach peninsula.

The point of this latter peninsula is also on a westward trek. It has moved about a mile in that direction in the last 30 years. As a result, the community of Point Lookout is threatened, since the inlet between the two reefs is also on the move and will not be completely stabilized until Jones Beach peninsula itself is checked. Way out at Montauk Point the erosion of the gravelly headlands continues at the steady rate of 18 inches a year. Points in between the two ends of Long Island show various degrees of erosion with an ever-changing topography of dune and beach.

However, the most drastic changes in contour and form were wrought by the two great autumn hurricanes, one in September, 1938, and the other in October, 1944. In the normal course of events such storms usually veer out to sea around Cape Hatteras, after creeping up the south Atlantic coastline from their tropical origin. But both these storms hit Long Island in all their fury after having gathered energy for the blow in their long over-water journey. The results were disastrous. The death toll was high as was the property damage. The beaches were subjected to a terrific pounding from mountainous waves. Protective dunes were leveled. New inlets into the sheltered bays were opened up from the ocean. They threatened to clog the boat channels with sand and thus tie up bay navigation. Remaining property, not already damaged, was deprived of further protection

(*Continued on page* 81)



Included in the New York State Department of Public Works erosion-control program on Long Island is the restoration of dunes along Jones Beach. For this "artificial nourishment", sand is dredged from the Great South Bay to the ocean front. At right the dotted line indicates the journey of a grain of sand from Montauk Point to Fire Island—another site of erosion-control work.

Eroded Beach "Nourished" By Pumping Sand From Bay With Small Dredges; One Typical Contract

✦ TWO sections of eroded dunes on the south shore of Long Island are being restored by hydraulic fills. These are at Gilgo and Cedar Beaches on the Jones Beach peninsula. After restoration they are being planted with beach grass to hold the freshly pumped sands in place. This work is typical of many similar operations to arrest beach erosion in the towns of Islip, Babylon, East Hampton, and Southampton, all in Suffolk County. The New York State Department of Public Works awarded the contract for it to the Walthaw Construction Co. of the Bronx, N. Y.

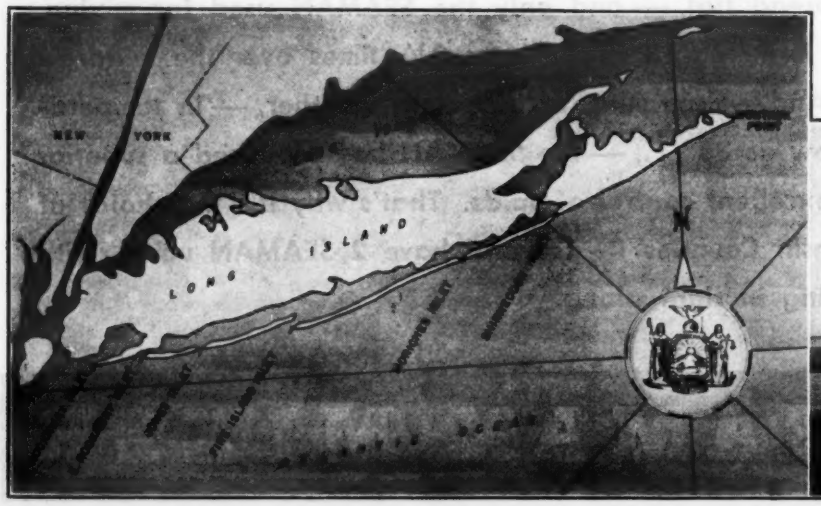
The section at Cedar Beach was done first. It involved restoring dunes for ¾ mile by placing 100,000 cubic yards of hydraulic fill. This was pumped from the Great South Bay which lies behind or to the north of the barrier reef. The Gilgo Beach improvement is longer, being 1¾ miles, and has required 200,000 yards of embankment in place. The material is also being taken from the same bay. Restoration work on these two beaches started in March and will be finished in September at a total cost of $74,800.

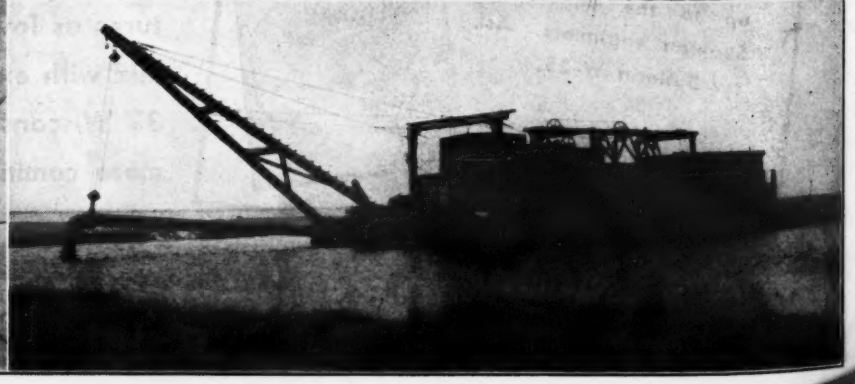
At these two projects, both located in the town of Babylon, the new fill is pumped to the ocean side of Ocean Parkway. This is a 4-lane concrete highway that runs east down the peninsula from Jones Beach at the west end to Oak Beach at Fire Island Inlet. The elevation of the parkway pavement averages 14.5. The crown elevation of the new fill is around 12.0, with the sands taking a natural slope of 1 on 20 to the existing grade of the beach. The base width of the new embankment averages 160 feet with a height of about 6 feet. Material for the fills was obtained by dredging cuts into the virgin salt-water meadowlands that lie from 6 inches to 1 foot above the level of the waters of the bay. Rectangular-shaped cuts were made, 16 to 18 feet deep, and 200 feet wide at the bottom, with side slopes averaging 1 on 3 to a width approximating 250 feet at the top. At Gilgo this cut is about 2,000 feet long. At Cedar Beach where a lesser amount of material is required,

(*Continued on next page*)

C. & E. M. Photo

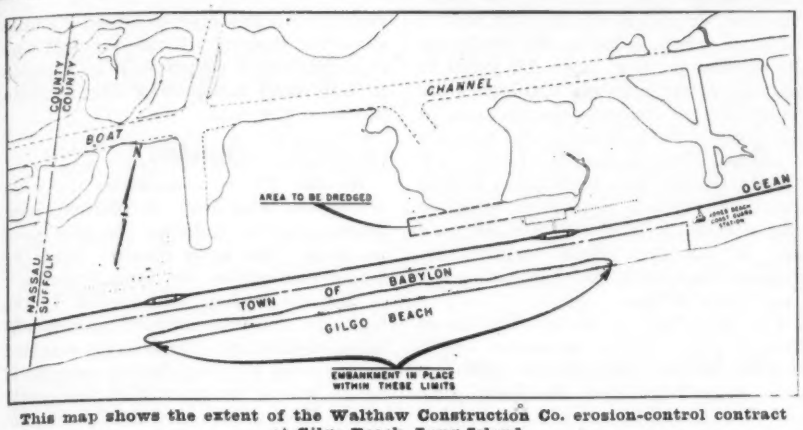
The sandy bottom of Great South Bay is a whales' graveyard containing quantities of bones, large and small. J. P. Polek, Engineer in charge for the State Department of Public Works (at right) and his assistant, J. E. Taylor, exhibit some relics brought to light on the Gilgo Beach job.





A large post-war program, of both dredging and jetty construction, to fight beach erosion on the south shore of Long Island was launched this spring. The map on the left shows the area of this erosion problem from Rockaway Inlet to Montauk Point. Below, dredge No. 2, owned by the Walthaw Construction Co., works on a typical erosion-control contract at Gilgo Beach, where 165,000 yards of hydraulic fill is being placed. The 32-year-old No. 2 has seen many years of service in the waters off Long Island. A problem plaguing the contractor on this project was the presence of whale bones in the sandy bottom. Frequent shut-downs to remove a bone from the 20-inch intake line (at right) were necessary.

C. & E. M. Photos



This map shows the extent of the Walthaw Construction Co. erosion-control contract at Gilgo Beach, Long Island.

Small Dredge Works On Erosion Control

(Continued from preceding page)

the cut is about 1,000 feet in length. Both dredged areas will be used as mooring basins for pleasure craft plying the waters of the bay. They will be connected to the 20-mile-long State Boat Channel which has been dredged in the Great South Bay on a course paralleling the coastal strip.

Walthaw No. 2

For this bay-dredging job the Walthaw Construction Co. used its No. 2 dredge, a 32-year-old wooden-hull craft with a 20-inch suction pump. The No. 2 has seen many years of service in the bay waters off the south shore of Long Island. Towns there use this smaller type of dredge to open and maintain channels connecting the many small villages on the mainland with the State Boat Channel. Dredges of this size are also used to deepen the water around the docks and piers, and in connection with many real-estate developments along the shore.

It is 115 feet long with a 31-foot beam and draws 6 feet of water. At the bow is a 45-foot A-frame secured by two ¾-inch steel cables running back on each side to fasten near the stern of the vessel. From the A-frame is suspended the 20-inch intake line. It projects 42 feet out from the bow and then makes a right-angle turn downward to continue for another 12 feet.

No ladder or cutter head is employed, as the dredging is a simple open suction action. The intake pipe makes a series of pot holes in the soft, almost submerged meadows. This causes the material around the holes to slough off and level out and finally to be sucked up as the intake pipe moves over the bay bottom. Neither has the dredge any spuds; it is held in position by four anchors, two on each side at stern and bow, tied to ⅞-inch steel cables, 500 feet long for each set. The swing cables are connected to a Lidgerwood 5-drum hoist located near the bow within the deck housing. One of these winches controls the movement of the pulley fall which raises or lowers the suction line in the water. The other four control the swing lines, two for the bow and two for the stern. By means of these swing lines the dredge moves back and forth across the width of the cut from its located position along the center line. When the dredge is ready to move forward, an auxiliary derrick boat raises the anchors which are moved ahead by tender.

The intake pipe enters the bow of the dredge a little to port of center. The reason is that the main pump, directly on line with it, has been located in that position in order to balance the weight of the engine which is slightly to starboard of center. The prime mover is a 1924 Bessemer 6-cylinder diesel engine. It has a 15-inch bore and a 22-inch stroke developing 670 hp at 225 rpm. Fuel is supplied to the engine from a 3,000-gallon diesel-oil tank. Directly forward of the engine is a rope-transmission drive. It has 20 turns of rope around a 90-inch drum and is connected to a 44-inch drum alongside the big drum and aft of the suction pump. By means of this transmission the pump revolves at 350 rpm when the engine is turning over 175 rpm. Because of the great elasticity in the 1½-inch hemp transmission rope, a line 270 feet long is required to take up the slack that develops when the dredge is pumping. The line winds around on top of the deck housing, passes over three large pulleys, and at one point has a 200-pound weight suspended from it to absorb part of the "play".

Whales' Graveyard

During dredging in the Great South Bay near Gilgo Beach, whale bones by the scores were pumped from the sandy bottom. They had been buried there for countless years. Now they have been moved from their graveyard since it was needed for hydraulic fill. Native beachcombers and clam diggers have an explanation of how these huge mammals were buried beneath the bottom of the shallow bay. At one time the bay had an inlet from the ocean at this point. Into it the tides swept dead whales. The ever-shifting sands soon covered them up. In time the inlet itself was closed, and the deep waters of the passage shoaled over and became shallow like the rest of the bay. So the bones rested under 2 to 3 fathoms of marsh and meadow until they were sucked up by the 20-inch intake pipe.

(Continued on next page)

C. & E. M. Photo

The 20-inch discharge line of the dredge No. 2 deposits sand at Gilgo Beach. Grade stakes mark the center line of the fill.

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After the fill is completed, beach grass is planted to stabilize the newly placed sand. Planting is done by several men sitting on this special rig. The grass is hardy and grows rapidly.

Small Dredge Works On Erosion Control

(*Continued from preceding page*)

Some of the bones went through the pipe and pump and were disgorged up on the beach. Others were much too large for the 20-inch line and often clogged the pipe at the intake. This meant that the dredge had to shut down until the whale bone was removed from its "throat" or intake. An 8-inch choke hole cut into the intake line 18 inches above the bottom helped to force the obstacle from the entrance by means of a heavy bar or wedge. If foreign objects were sucked up through this pipe they could also be removed before entering the pump. The cover was simply lifted from a manhole just forward of the pump by an overhead Yale 4-ton hoist. It is located at that position on the dredge in order to service the pump or to replace any of its parts.

Pumping Operations

The 20-inch pump was built by the Walthaw Construction Co. from parts of other units. It has a 5-vane 54-inch impeller with a clearance of 8 inches. The gages in the control room show an average of 15 inches of vacuum on the pump with the pressure varying from 35 to 60 pounds to the square inch. When it is operating most efficiently it pumps about 7 per cent solids. The thrust in the pump is taken up by a thrust bearing located directly aft of the pump. The main engine has no clutch equipment, so the engine must be stopped in order to shut down the pump. To start the big diesel again a 2-cylinder gasoline engine is used to run a small air compressor. This supplies the pressure for getting the prime mover in motion. Another diesel, a Wolverine 2-cylinder 43-hp engine, is used to prime the main pump with a 4-inch water pump. This engine also drives a 3-kw generator which supplies the dredge with electricity for lights. Another auxiliary diesel furnishes power for the five winches.

Leaving the pump on the port side, the 20-inch discharge pipe ascends to the deck. It runs down the port side to the stern, where it leaves the dredge on the floating pontoon line. All joints in the pipe where it enters and leaves the dredge on the floating line, and also at the elbow in the forward intake line, are of rubber. The floating line is from 100 to 300 feet long. It is made up of 40-foot lengths of 20-inch pipe. Each length is supported on 2 drums, 15 feet long x 4 feet in diameter, held together by wooden strongbacks fastened across the tops of the drums.

The land line, in 15-foot lengths of 20-inch pipe, had a maximum length of 4,200 feet as it crossed the 1,000-foot strip of reef to reach the ocean side, and then branched out to either end of the area to be filled. The land line was equipped with slip joints. Two different lines were laid across the barrier beach. One went through a pedestrian pass beneath Ocean Parkway when the eastern half of the fill was being placed. The other line was laid across the road when the pumping was going to the west end of the fill. A cinder ramp was built over and around this pipe to afford a gentle slope for motorists to go over. Warning signs were posted well in advance of the ramp to appraise them of the bump in the road.

Planting

As the fill is completed, the area above 8.0 elevation is planted with beach grass to stabilize the new sand in place. The area reaches from the 8-foot contour on the ocean front back to the original ground almost to the highway, and this contract comprises 56 acres of planting. The grass is obtained by thinning out neighboring sections of beach where the growth is sufficiently thick. Each plant is required to have at least five rooted stems, and they must be put in the ground within 24 hours of the time they are uprooted. Planting is done by several men sitting on a special rig pulled by a tractor. As they are pulled slowly along, the men stick the beach grass 8 to 10 inches into the ground on 15-inch centers both ways,

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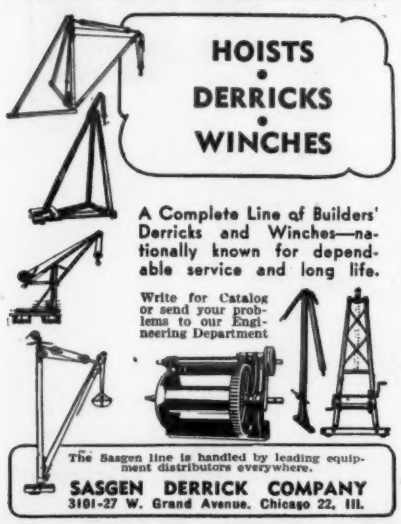

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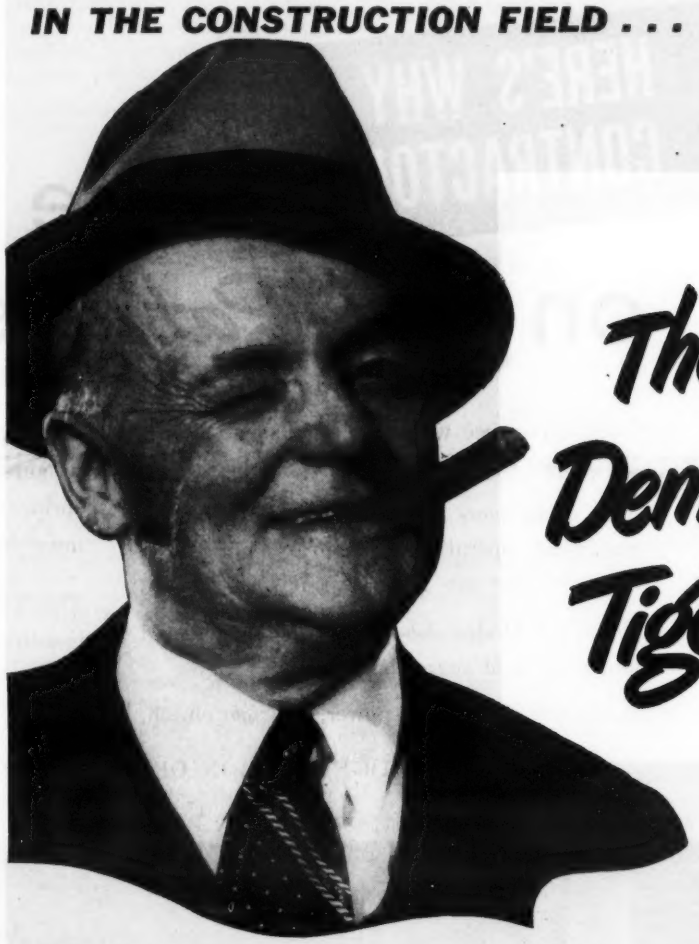

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Small Dredge Works On Erosion Control

(*Continued from preceding page*)

leaving about the same length of grass projecting. The hardy beach grass grows readily and is an important factor in preventing erosion.

Personnel

The No. 2 has dredged an average of 50,000 yards a month with a total force of 10 men working a single shift of 8 hours a day, 5 days a week. The dredge crew consists of 7 men. The remaining 3 make up the land force which is aided in the manipulation of the land line by a Cletrac 30 tractor.

Captain Frank Finlay is Master of the No. 2 dredge and Superintendent for the Walthaw Construction Co. Hiram Davidson is its Chief Engineer. J. P. Polek is Engineer in charge of the project for the New York State Department of Public Works, assisted by J. E. Taylor. This beach-erosion control work lies within District 10, comprising all of Long Island, which is headed by J. J. Darcy, District Engineer.

Between the two stretches of beach at Gilgo and Cedar, which are restored by this contract, lies a 9,300-foot section of beach. This is the property of the state and known as Gilgo State Park. A contract for the restoration of the dunes in this area and the planting of 30 acres of beach grasses was awarded this summer to the Gibson & Cushman Corp. of Bay Shore, L. I. It started its work in July with a 20-inch suction dredge. This contract is handled by the Long Island State Park Commission, which operates the beach parks, and the project is expected to be completed this year. Sidney Shapiro, Deputy Chief Engineer of the Long Island State Park Commission, supervises the dredging and placing of all hydraulic fills in this beach erosion-control work.

New Waterproofing Is Given Severe Test

A recent series of waterproofing tests were conducted by Aquella Products, Inc. to demonstrate its concrete-waterproofing product. The tests, held publicly at the plant of the National Brick Corp. in Long Island City, N. Y., were described as fifty times more severe than Bureau of Standards demands.

The test measured the effect of a hydrostatic pressure created by an 8-foot head of water on a surface treated with the new waterproofing compound. Two towers of highly porous cinder-concrete blocks were erected for the test. Each had an absorption rate determined as from 22 to 25 per cent by weight.

Both columns were tested first in their natural state to show their identical coefficients for permeability. Then one was treated with Aquella, and the other was not. The Aquellized tower withstood the pressure of an 8-foot head of water, the firm reports. This is equivalent to a hydrostatic pressure of about 500 pounds per square foot at the base.

The untreated tower could not be filled with water higher than 18¾ inches, due to a seepage rate of 2 gallons per minute. Bureau of Standards specifications in such tests call for only a 2-inch head of water, or a 10-pound pressure per square foot.

Further information on these tests and on the features of Aquella may be secured direct from Prima Products, Inc., 10 E. 40th St., New York 16, N. Y.

Catalog Shows Jack Line

Jacks for lifting, pulling, bracing, and other construction and maintenance needs are pictured in a new 8-page catalog issued by the Buda Co. Among the ratchet, screw, and hydraulic jacks shown, there are such items as trench braces, push-pull units, shoring jacks, cable-reel screw jacks, a "Klinch-Klaw" jack for pulling bolts and spikes, and the more conventional models. Bulletin 1040-D can be obtained from the Buda Co., Harvey, Ill.

Truck-mixed concrete for a new addition to a plant in Indianapolis is delivered to forms or waiting concrete buggies by an American Con-Vay-It. This portable unit, mounted on rubber tires and electrically operated, comes in 20-foot lengths. Any number of units can be used as required for the speedy placing of concrete.

LORAINS LEVEL MOUNTAIN TOPS
for West Virginia Airport

1¾ yd. Lorain-80 eats its way through a mountain top rock cut.

MOUNTAINS—not meadows—serve as the locale for the new Kanawha, W. Va. Airport. Leveling the 400 acres required calls for 9½ million yards of excavation, 40% of it rock—involves clipping up to 130 feet off mountain tops and filling valleys ranging up to 210 feet in depth.

The contractor, Harrison Construction Co., Pittsburgh, Pa., having purchased a total of 24 Lorains, is using a full range of Thew-Lorain equipment, from the big 2-yard Lorain-82 "rock buster" shovel down to the agile, fast-stepping Moto-Crane. Over 4 million yards have been moved to date, with the Lorain shovels averaging 1200 yards per 8-hour shift.

Predominance of Lorains on many important contracts such as this gives proof to the fact that every unit in the Lorain line (½ yd. and up) is tops in its class. Catalogues on any or all of these shovels and cranes can be obtained from your local Thew-Lorain distributor.

Moto-Crane, wielding 4500 lb. skull cracker on oversize rock fragments, eliminates secondary blasting.

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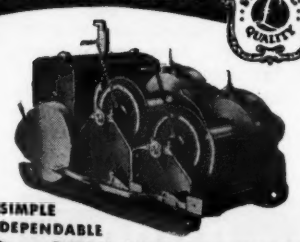

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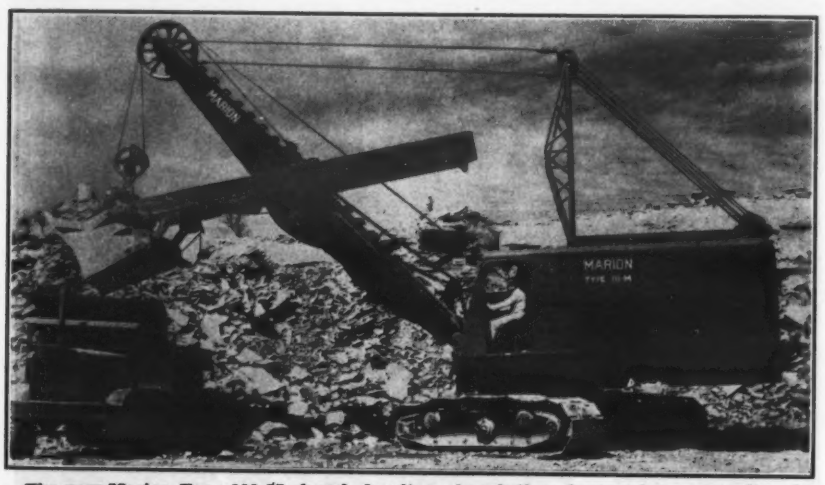

The new Marion Type 111-M shovel, dragline, clamshell, and crane has a capacity of 3½ to 4 cubic yards and is diesel-powered.

All-Purpose 4-Yard Heavy-Duty Shovel

A diesel-powered 3½ to 4-cubic-yard shovel which can be shipped without major dismantling has been announced by the Marion Power Shovel Co. Designed for heavy duty in general construction, quarrying, mining, and stripping, the unit is convertible to dragline or clamshell.

Known as the Type 111-M, this all-purpose machine has welded construction throughout. Stability is achieved by its low center of gravity, Marion says. Particular attention has been paid to the heavy-duty requirements for speed, power, ease of control, and maneuverability.

Crawlers can be supplied in varied lengths and widths. The upper deck carries the two main shafts, mounted in anti-friction bearings. Air controls, with the lever pressure held at a 12-pound maximum, and compensating-type valves aid the operator.

Full box-section construction with rounded edges features the shovel's boom. It has a wide, spread base, extra-large boom sheaves, and wide sheave bearings. The shipper-shaft pinions are double-shrouded. The dipper handle is connected to the dipper by wide bearing bosses.

Type 111-M's gantry can be lowered quickly to the level of the cab roof for rail shipment, Marion says. When supplied for crane or pile-driver service, the unit has a box-section boom which features a goose-neck design in its point section. An independent live boom hoist also can be supplied for crane service.

Write the Marion Power Shovel Co., Marion, Ohio, for further details on this new heavy-duty all-purpose 3½ to 4-yard machine. Just mention this news item.

Marked Equipment Pays You Dividends

Many highway superintendents and many contractors want a distinctive identification mark for their equipment —whether a huge road-building machine or a small hammer. Recognition everywhere that a major piece of equipment is theirs is good public relations. Labeling small tools keeps them from becoming lost, strayed, or stolen. Equipping machinery with operating instructions is also a good idea, especially when factory stencils have worn off. If they are not replaced, an uninstructed worker may damage the machine.

Many organizations have begun to use a simple device for these labeling needs. This is the Decal transfer. The Decal is specially prepared paper. When dipped in water, it transfers its full-color printing surface onto the equipment in a matter of seconds. These transfers can replace costly hand-lettering methods, with greater uniformity of design and coloring. They have a protective coating which gives them a long, durable life. When worn out, they can be replaced with little delay and no design variations.

Continental Decalcomania Co., 572 Division Ave., S., Grand Rapids, Mich., will be glad to tell readers of CONTRACTORS AND ENGINEERS MONTHLY how Decals can be of use to them. Mention this news story when writing the firm.

AISC Office in Phila.

The American Institute of Steel Construction has opened a district office in Philadelphia. Located at 1617 Pennsylvania Blvd., the office is under Henry J. Stetina, District Engineer. It will supply AISC technical publications and general information on the structural-steel fabricating industry.

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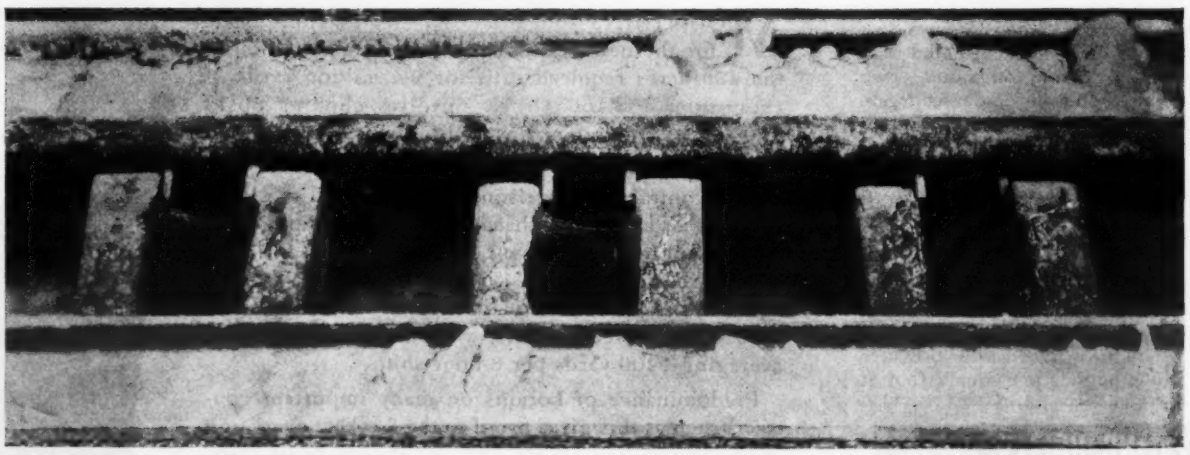
The massive concrete chambers of the South Side Filtration Plant in Chicago pictured above are free to move (as all concrete structures must with temperature change and settling) without danger of leakage or foreign matter getting into the purified water. To a large extent this is made possible by the use of Servicised Para-Plastic compound to seal the joints in the structure, so that regardless of movement they stay sealed. In addition, Servicised furnished the premolded, resilient, non-extruding joint filler which was made to meet Federal Specifications HH-F-341. In general, we recommend for use on all concrete construction required in connection with either water works or sewage treatment, Servicised Cork or Self-Expanding Cork Joint Filler combined with Servicised Para-Plastic Joint Sealing Compound for a perfect job.

Para-Plastic is scientifically made to meet all needs for waterproofing concrete joints and is given numerous tests in our laboratory prior to shipment. One of these tests is pictured below.



The above view showing the "Bond Test" gives only a small interior section of a large specially constructed Freezing Unit with powered "separators" where hundreds of small samples of Para-Plastic are tested for Bonding Power and Extendability at O'F.

Para-Plastic is applicable for a great variety of uses: besides being a hot pouring compound it is also made into a number of premolded forms. The wide classification of Expansion Joints makes it important that the right joint material and form be selected in each instance. There is not a better guarantee of safety for your investment than this assurance. SERVICISED Laboratories and Engineering Departments are ready at all times to assist with your joint sealing problems and to offer recommendations gratis on the basis of experience gained in this field during the past 25 years.

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New Developments Correct Rigid-Pavement Pumping

Mud-Pumping, Bituminous Under-Sealing at Joints, Plus Hydraulic Jack Which Raises Slabs, Aid in Work

By F. H. GREEN, Research Engineer, Joint Highway Research Project, Purdue University

✦ ONE of the predominant types of highway failures during recent years has been pavement pumping. This is the ejection of water-suspended subgrade soil at pavement joints, cracks, or edges. It is caused by deflection of the pavement slab under the action of traffic. The prevention and correction of pumping joints in rigid pavements remains one of the most difficult problems which confront highway engineers.

In the Indiana state highway system, about 250 miles of roads are, to some extent, in distress due to pumping. This mileage represents about 6 per cent of all the rigid pavement in the system. Pumping has progressed on some of the roads to a stage where their usefulness is seriously impaired. In other locations, the removal of small amounts of material from beneath the pavement is just becoming evident. But past experience has shown that most pavements pass from the mild stage to the serious stage within a very short time —usually one or two years.

Causes and Standard Preventives

It is generally agreed that there are three factors which must be present before pumping action takes place. These are (1) heavy traffic in concentrated loads, (2) susceptible subgrade soil, and (3) water in and on the subgrade. The maintenance engineer can control only the third element, that of subgrade water, when he tries to prevent or to arrest pumping at joints.

Established maintenance procedures can be used to good advantage in controlling the amount of water which will reach the subgrade. Adequate drainage should be provided by keeping side ditches open. Shoulders should be maintained with proper slopes away from the pavement. Shoulder maintenance at the pavement edges is important, and porous surface material adjacent to the pavement should be avoided. Joints and cracks should be filled with bituminous material at regular intervals, to prevent surface water from entering. All these standard practices help to control the accumulation of water beneath pavement. In this way they tend to prevent pumping.

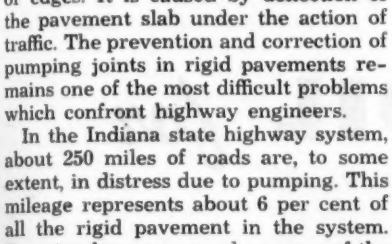
But in addition to these regular maintenance procedures, new methods have been devised which prevent surface water from reaching the subgrade, and at the same time help to control the movement of the pavement slab. These operations consist of forcing a waterproof or a water-resistant material through holes in the pavement near the joints. The material acts as a filler for voids in the subgrade, and also as an under-seal. Two different operations have been developed. One of these is known as mud-pumping and the other as bituminous under-sealing.

Mud-Pumping

Mud-pumping was first used a number of years ago to correct settlements in rigid pavements on bridge approaches and embankments. A slurry, consisting of soil, cement, and water, was pumped through holes drilled into the pavement, and the slab was lifted by hydrostatic pressure. In order to

(*Continued on next page*)

Indiana uses this type of mud-pumping machine, placed directly over the hole in the pavement, to correct the loss of subgrade, known as pumping, at joints.



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Pavement Pumping

(*Continued from preceding page*)

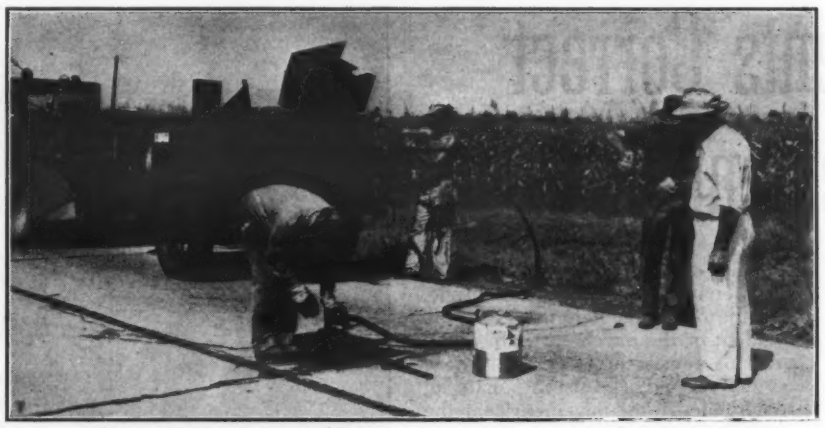
obtain enough lifting ability, the slurry was mixed to a rather stiff consistency. Satisfactory distribution of the material was obtained by the use of many holes spaced at close intervals. When this method was adapted for use in the treatment of pavement joints, bituminous material was also added to the slurry to make it more water-resistant. Moreover, the mix was changed to a thinner consistency, to facilitate its flow to all parts of the subgrade adjacent to the joint being treated. In most cases, only one hole was drilled at each joint.

The Maintenance Department of the State Highway Commission of Indiana recently tried out a small mud-pumping machine, constructed especially for use in the treatment of pavement joints. The machine consists of a small hopper and pump. It can be moved by one man and placed directly over a hole in the pavement. A thin-mud slurry, containing soil, cement, emulsified asphalt, and water, was mixed in a small bituminous mixer and placed in the hopper. The material was forced through the hole without difficulty, and apparently was well distributed over the subgrade in the vicinity of the joint. The pavement-pumping action appeared to be arrested, although it is not yet known how durable the material will prove to be.

Bituminous Under-Sealing

Bituminous under-sealing was developed in Ohio three years ago. Bituminous material was heated in a regular truck-mounted bituminous distributor. It was then pumped through a hose, the nozzle of which was placed in a hole in the pavement near the joint. It was found that the material flowed readily and spread uniformly over the subgrade. Also, the material was forced up into the lower part of the joint to form a watertight seal. A soft grade of asphalt cement was used in the earlier experiments, because it could be applied at a relatively low temperature. But the material sometimes softened enough in hot weather to come up through the joints. A harder asphalt, corresponding to the joint-filling material generally specified in Indiana, is now being used.

In Indiana, this type of joint treatment was begun on an experimental basis during the past season by personnel of the Indiana State Highway Maintenance Department, assisted by some staff members of the Joint Highway Research Project. They used specially equipped tar kettles instead of large distributors. In this way they did not need to accept delivery of large quantities of the bituminous material. Too, they scaled the operation down to a point where it could be carried on by a small crew. Several joints were sealed on U. S. 30 in the LaPorte District, and on U. S. 52 in the Crawfordsville District. The Maintenance Superintendents in the Valparaiso, Frankfort, and Fowler Subdistricts supervised. The treatment appeared to seal the joints successfully and to fill the voids in the subgrade.



One of Indiana's methods of preventing surface water from reaching the subgrade is bituminous under-sealing. Here asphalt cement from a specially equipped kettle supplies the bitumen for use at a pumping joint.

In order to inspect the distribution of the under-seal, the concrete pavement was removed at one of the joints that had been treated. It was found that the bituminous material had formed an unbroken membrane between the subgrade and the pavement. This extended for a distance of approximately 4 feet on each side of the joint. In addition, the material had been forced into the underneath side of the joint, apparently sealing it.

Some difficulty was encountered in handling the hot asphalt with the small tar kettles. It is probable that heavier equipment with larger pumps would prove more practical.

(*Continued on next page*)

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Pavement Pumping

(*Continued from preceding page*)

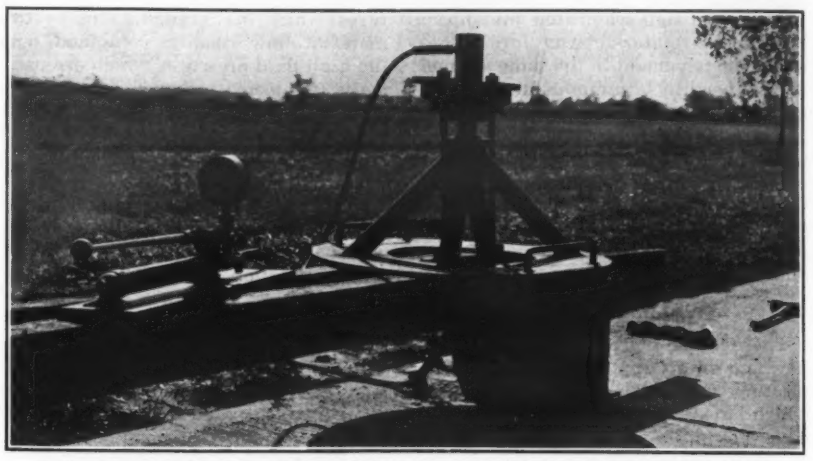
Correcting Faulted Joints

One of the characteristics of a pumping pavement is the faulting, or misalignment, of the pavement slabs adjacent to the joints. Load-transfer devices have, in general, failed to prevent faulting joints, although they probably retard this action to some extent. Round dowel bars have been about as effective as any type of installation. But eventually they bend and permit the joint to become faulted.

When pumping first starts, the slab completely recovers its position between load applications. But as material is gradually removed from the subgrade and as the magnitude of the deflection is increased, the slab finally fails to recover its position completely. The joint becomes faulted permanently. This action usually causes the concrete to break on a transverse line 6 to 8 feet from the joint. After the break occurs, the pumping action may decrease or stop altogether. The pavement slab may even remain in this condition for some time before further disintegration or faulting occurs. But the existence of faulting is serious. It produces impact, which contributes to the further destruction of the pavement. In addition, the riding quality of the pavement is seriously impaired.

Some very interesting information on faulted joints was recently obtained in a field inspection on U. S. 30, in Lake County, Ind. It was collected by members of the Testing Department and of the Research Project. In 1937, the State Highway Commission constructed a series of test sections as part of a regular construction contract on U. S. 30. The Testing Department developed seven different types of subgrade treatments, each of which was approximately 2,500 feet long, located on the two eastbound lanes. The treatments included sand backfill, limestone dust, water-saturated soil, soil-bituminous mixtures, and stone stabilization. For comparative purposes, the adjacent 10,000 feet to the east of the test sections, located on similar plastic soil, was included in the field investigation.

The amount of faulting was measured at many representative joints on each section, and also on the untreated portion. Then the total amount of offset



Indiana has developed a mechanical jack for realigning the slabs at faulted joints.

was computed. It was found that for the sand, stone dust, and limestone treatments, the total amount of faulting averaged less than 2 inches per 1,000 feet. For the bituminous treatments it was less than 4 inches. But on the untreated portion, as well as on the water-saturated test section, the total amount of offset at the joints averaged more than 11 inches for each 1,000 feet. The 16 miles of eastbound two-lane pavement adjacent to these test sections was considered fairly representative of the untreated portion which was included in the investigation. It was estimated that all faulting at the joints on this stretch would total about 80 feet of vertical offset.

The results of this investigation indicate that subgrade treatments eliminate or greatly reduce the pumping of joints, and that the amount of faulting is thereby reduced. Also, it was noted that there were more cracks between joints on the untreated than on the treated sections. However, the cracks were not pumping, nor were they faulted to any appreciable degree, even on the portion of road where the joints were in serious distress.

Correction of the differential vertical displacement between the two slabs adjacent to the joint has proved to be a difficult operation. It was observed, for example, that the hydrostatic pressure produced by forcing mud slurry or bituminous material beneath pavement tended to raise both sides of the joint.

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Pavement Pumping

(*Continued from preceding page*)

Friction within the joint structure sometimes lifted the higher slab enough to allow the material to flow beneath it, and the hydrostatic pressure was more or less equalized on both sides of the joint. This was found to be especially true at joints with dowels or with other load-transfer devices.

In order to insure a uniform distribution, the material used in both the mud-pumping and the bituminous under-sealing operation was of a thin consistency. Although desirable from the standpoint of filling existing voids and sealing the underneath part of the joint, this made it more difficult to control vertical correction of the slab. The material tended to flow from the joint and cracks and from the edge of the pavement. During the experimental under-sealing work, several observations were made on the treatment of some of the joints faulted approximately ½ inch. It was found that during the treatment the lower slab was raised about ¼ inch and the higher slab about ⅛ inch, before the bituminous material was forced out at the side along the pavement edge. With the mud pump, more vertical movement can be obtained, especially if the slurry is mixed to a slightly thicker consistency.

However, it is the opinion of the author that no fluid or semifluid material can correct faulted joints consistently and accurately by hydrostatic pressure. The resistance of the joint, and especially of the load-transfer device, usually prevents the lower side from being lifted independently of the other. And the amount of vertical correction which can be obtained before the material flows up through the joints or through the shoulder is uncertain, generally uncontrollable, and may be negligible.

Mechanical Pavement Jack

Both mud-pumping and bituminous under-sealing operations appeared to be successful in sealing joints, and in filling voids in the subgrade adjacent to the joints. So it seemed desirable to devise some mechanical method of realigning the slabs at faulted joints. Then the corrective treatment could be completed. The approach to the problem was direct, and the method which was developed was simple in its application. A mechanical jack was designed and constructed which will lift a slab in a positive manner, at the same time restraining an adjacent slab from vertical movement.

This equipment consists primarily of a hydraulic jack mounted upon steel beams. One of the beams is placed adjacent to the joint, on the higher side. The other is placed on the lower side, 8 or 10 feet distant. Special expanding shields and tapered shafts are inserted in two holes drilled through the lower slab near the joint, and the shafts are attached to the jack.

In testing this equipment, a typical joint was selected. It was faulted ⅞ inch, and the forward slab was broken on a line 8 feet from the joint. The joint contained dowel bars. The mechanical pavement jack was attached near the outside edge of the pavement, and the lower slab was raised until it was in alignment with the opposite side of the joint. During the jacking operation, lifting stresses were recorded on a gage mounted on the jack. It was found that a force of approximately 5 tons was needed to "break" the pavement loose. After that, only a 3-ton force was needed to continue the lifting. But as the slab approached the elevation of the adjacent slab, the force required suddenly increased to 10 or 12 tons, as the load-transfer device tightened up in reversed stresses.

After the slab was lifted into place, bituminous material was forced beneath the pavement in the same manner as was used in bituminous under-sealing. The jack was left in place for about 15 minutes, to permit the bituminous material to cool and harden. It is the opinion of those who have worked with the machine that this new method of realigning pavement slabs is practical, when used in conjunction with mud-pumping or bituminous under-sealing.

Treatment Material

There is still a great need for entirely new and different material to be used in treating joints. The various mixtures which have been used in mud-pumping have not proved entirely satisfactory. Mixtures containing soil apparently do not have the inherent strength and durability to withstand, for long, the destructive forces to which they are subjected beneath a pumping pavement. The bituminous cements which have been used for under-sealing also have many disadvantages. The high temperatures which are needed to make this material flow readily, combined with the high fluid pressures which are used, make its placing rather hazardous. The use of a full-sized bituminous distributor requires a large crew, and does not lend itself to ordinary maintenance operations.

In this work of joint treatment, the cost of the material is relatively unimportant, since a greater part of the cost of the operation is for labor and equipment. For this reason, a new material could be higher in cost if it proved durable and easily placed, and if it could be made to harden reasonably soon after placing. The Joint Highway Research Project has initiated a program of laboratory and field research to study the possibilities for a new material of this kind. During the next few months it is expected that several new mixtures will be tested. They will be used in experimental joint treatments, both for under-sealing and in conjunction with the mechanical pavement jack.

The annual destruction of good concrete pavements by pumping joints offers a challenge to the ingenuity of men who are charged with maintaining highways. A good start has been made in the use of mud-pumping and under-sealing treatments. The mechanical pavement-jacking equipment also shows promise of aiding in the problem. Inevitably these methods will be further developed and the material they use will be improved. With proper preventive and corrective treatment, years of service will be added to some pavements which might otherwise be discarded.

From a paper presented at the 32nd Annual Purdue Road School.

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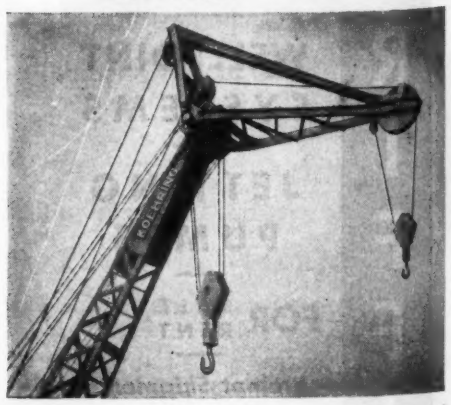

Jib boom extension, shown above, is also available. Second drum permits reeving two hoist lines, using either, one on main boom or one on jib, depending on load and lift desired.

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AED Wants Disposal Of Surplus at Once

Rapid disposal of surplus war property *now* has been called for by the Associated Equipment Distributors in a strongly worded attack on surplus-disposal techniques. The action was taken by the AED'S Board of Directors at its semi-annual meeting in Chicago during June.

Holding that the system of priorities established by the Surplus Property Act "puts a premium on fraud and dishonesty", the AED called for elimination of all special preferences, priorities, and privileges for at least a year. During this moratorium, surplus would be disposed of through well advertised spot sales.

Following a special conference of the Committee on Government Surplus Disposal, headed by Ed. P. Phillips, Richmond, Va., the Directors adopted a resolution. It declared among other things that "billions and billions of dollars of surplus are now in storage, little is being sold, and that which is being sold is not finding its way into established or normal trade channels . . . rather it is being used to feed speculative markets." Disposing of surplus immediately would effect eleven benefits, the Directors claim.

F. B. McBath, President of the AED, presided at the sessions. Other business transacted included the fixing of the next annual meeting. It will be held at Chicago, February 13 to 16, 1947.

Versatile, Flexible High-Speed Grinder

Convenience and flexibility of use are features claimed for a new Universal Hy-Speed grinder announced by Wyzenbeek & Staff as part of the Wyco line of tools. Compactly built, this grinder can be set on a bench, hung from a hook, or suspended from the operator's belt.

The new Wyco is built in three sizes for light, medium, and heavy service in high-speed grinding, burring, filing, sanding, and polishing. They have a free speed of 10,000 rpm. All are powered by the Universal ac-dc motor with a toggle switch in its base.

The flexible shafts have the patented Wyco casing that is covered with oil-proof synthetic rubber, and innerlined with non-metallic graphite-impregnated Wyco Innerliner. These are said to insure a vibrationless, true-running shaft. Hand pieces are cool-running, ball bearing-equipped, with ¼ and ⅛-inch collets.

Further details on this handy shop tool can be secured by addressing the manufacturer, Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill. Mention this news notice.

Difford Leaves Fir Assn.

Harrison Clark has been advanced to Managing Director *pro tem* of the Douglas Fir Plywood Association, following the retirement of W. E. Difford. Mr. Difford held the post eight years.

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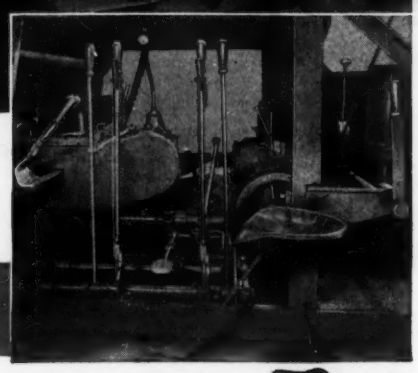

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Dirt-Moving

(*Continued from page 2*)

about 40,000 cubic yards of imported borrow material into Matich's fleet of 9 GMC and International dump trucks, all of which are equipped with 8-cubic-yard beds.

A number of eucalyptus trees were also taken out by excavating along one side of them and then pulling out the stumps with one of the D8's.

Water Mains a Problem

One of the most perplexing problems in connection with excavating cuts was how to proceed without disturbing innumerable water lines which crossed the road. Some of these lines were none too deep. Any accidental break resulted in a mudhole. Near the center of the job a 24-inch water main crossed the highway. It carried irrigation water from Big Bear Lake towards the rich citrus-growing valley to the west. The nearest valve which could shut water off in this line was located at the lake, some 15 miles away.

Obviously any break in this line would flood the country before the valve could be reached. So John Matich, Sr., one of the contractor partners and General Manager of the job, directed a labor crew to work with surveyors and locate this line exactly. When their shovels finally struck the big pipe, it was flagged and made "out of bounds". A new trench was then dug much deeper, and a new 24-inch pipe line laid. Next, the water was shut off at Big Bear for about 24 hours, and the excess water siphoned out. The new connection with the old pipe was safely made, and then the old pipe was rooted out along with that section of excavation.

Care of Equipment

Matich Brothers was not able to get much new equipment during the war. Purchases were limited to a few tractors and a new Caterpillar 12 motor grader. But the old machines, many of which saw service on defense construction before the war, are being kept up by careful maintenance, expert repair, and adequate lubrication.

The Matich outfit has not had any piece of heavy equipment break down due to engine failure for eight consecutive years. According to John Matich, Jr., Job Superintendent, the company has achieved this record simply by greasing the machines once a shift and changing engine oil at 60 operating hours. Once each 8-hour shift on this particular job, a traveling fuel and Alemite truck went out to each machine and serviced it.

Pennzoil's lubricants are used exclusively by Matich Brothers. Cha-Z-e Lube No. 315 is used on tractor track rollers. Cha-Z-e Lube No. 316, a lead-base general-purpose lubricant, is used also. Pennzoil BT&T motor oil is used in the engine crankcases of tractors, trucks, and shovels, while straight mineral SAE 160 oil goes in all gear boxes. Cling-Rite grease is used for the lubrication of wire rope.

Concrete Work

One of the unusual design features of the new highway pavement is the absence of dowel bars. In lieu of them, tie-bolt assemblies were installed. These consist of two machine bolts connected by means of a threaded coupling. One-half of the assembly, with the coupling, was poured at a construction joint. When the adjacent pour was ready, the other half of the tie bolt was then screwed into the coupling, and the load transfer at the joint is successfully made. These tie bolts are ⅝ inch in diameter by 15 inches long, and are spaced on 30-inch centers.

(*Concluded on next page*)

C. & E. M. Photo
Ray Day, our Western Field Editor, and Superintendent John Matich, Jr., (at right) get together on some information from the specifications.

Dirt-Moving

(Continued from preceding page)

A Lewis subgrader was used in preparation for concrete work, after Blaw-Knox forms were set. Matich Brothers had about 12,000 linear feet of these steel forms available. They were set at least 3,000 feet ahead of the paver.

Concrete aggregates came from the Redlands Gravel Co., and from the Triangle Rock & Gravel Co. In either case it was approximately a 5-mile truck haul. Aggregates were batched from a 4-bin Blaw-Knox batching plant with automatic weighing scales. The capacity of this plant, which is new, is 80 batches per hour. The batch size was 34 cubic feet. Colton portland cement was used, batched in bulk from a cement silo.

A Rex 34-E dual-drum paver mixed the concrete and dumped to a Jaeger spreader. This machine was followed by a Jaeger-Lakewood finisher, and the final surfacing was administered by a Johnson horizontal float finisher.

Longitudinal joints were formed by a wood key bolted on to the Blaw-Knox forms. Weakened plane dummy joints were placed on 15-foot centers. Construction joints have a tie-bolt assembly and were filled with mastic material. When concrete work started in May, Concrete Superintendent Jim Backus expected to finish about 2,000 linear feet of 12-foot pavement each 8-hour day.

Backus, incidentally, is an experienced concrete pusher who has poured many thousands of yards of concrete, including approximately 73,000 at March Field, for Matich Brothers. He is an old du Pont construction man, and what he doesn't know about concrete just hasn't come up.

Traffic Routing

Traffic was handled by routing the vehicles over city streets in Redlands, and by allowing them to use the existing highway outside of the city. The slab on the new realignment was poured before any conversion work is done on Highway 99. After the new pavement has been turned over to traffic, the old road will be rebuilt.

Personnel

In addition to the persons already named, Sam Peyton is Master Mechanic for Matich Brothers. For the California Division of Highways, Joe Hollister was the Resident Engineer in the field. G. T. McCoy is the State Highway Engineer for California.

C. & E. M. Photo
Matich Brothers rigged up this water tank which can spray water at some distance to the side of the machine as well as behind the truck.

Proper lubrication is essential to keeping your equipment operating profitably. Choose your lubricants wisely and use them regularly.

Cummins Officer Retires

Paris E. Letsinger has been elected a Director of the Cummins Engine Co., Columbus, Ind., following his retirement as Vice President in charge of distribution. Formerly with the White Co. on the west coast, he joined Cummins in 1933.

IT'S STANG
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THAT DRIES THE JOB!

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When STANG takes over, with STANG Equipment plus STANG SUPERVISION—you get the results you want! STANG will properly lay out and supervise the installation and the operation of a Wellpoint job because we KNOW HOW to meet the most difficult conditions, with minimum cost for labor and materials.

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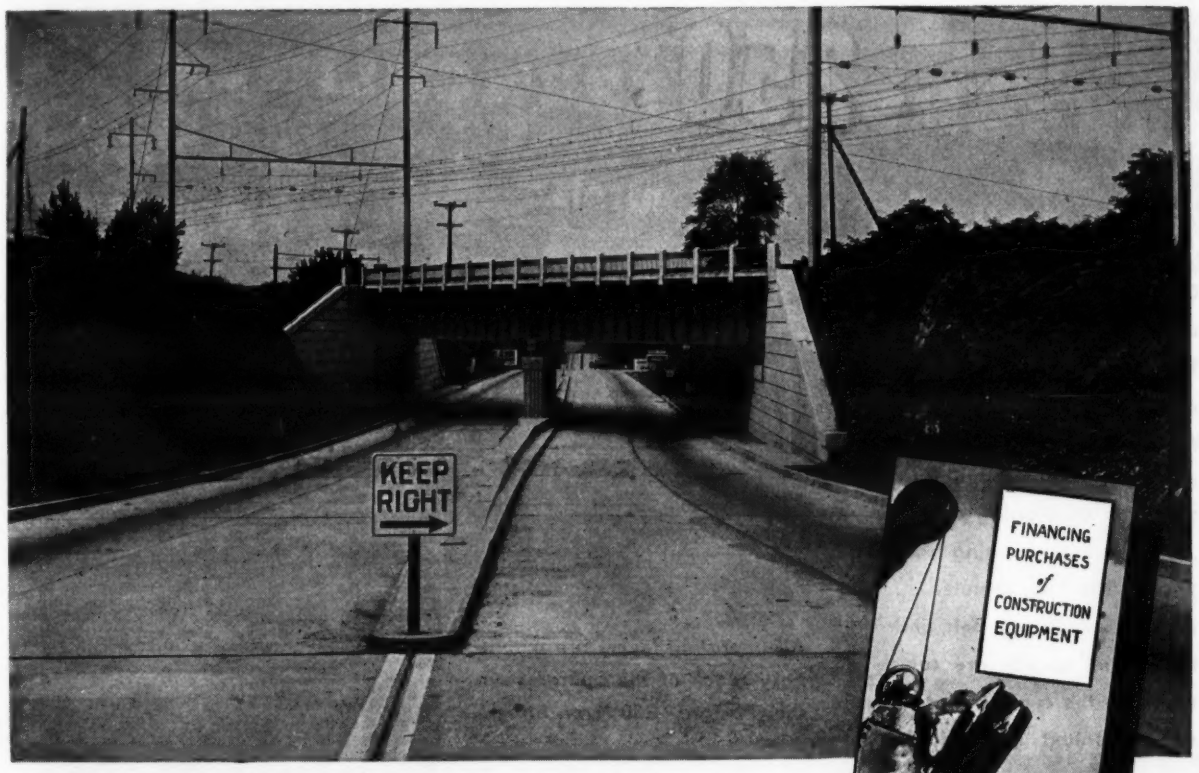

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Contractors: Instead of tying up valuable working capital in purchases of Construction Equipment, LET C.I.T. FURNISH THE FUNDS.

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Send for free copy of new booklet on "Financing Purchases of Construction Equipment." It explains our LOW COST plan; tells how contractors arrange C.I.T. financing.

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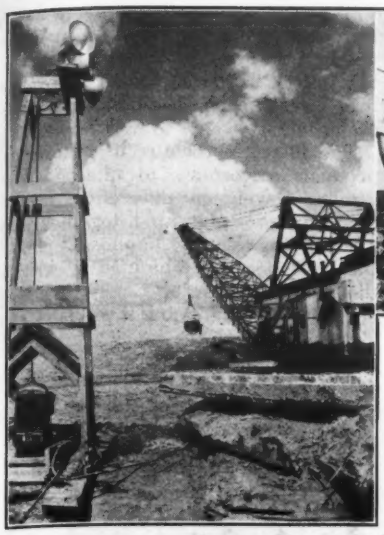


Non-stop activity, 24 hours a day, is the rule on levee work. Left, an Onan electric plant furnishes current for lights on a skid-mounted tower which can be moved around the job. The Bucyrus Monighan walking dragline used on the job is at the right. Above is a close-up of the Onan plant in its protected spot at the base of the tower. C. E. Brame, Superintendent, talks over the project with John Combe, a Fairbanks-Morse representative.

Power Units Speed 24-Hour Levee Job

Keeping the mighty Mississippi in check in the Delta country of Louisiana is an endless task. Often it seems to be a hopeless one. But this past spring the Walter P. Villere Construction Co. of New Orleans undertook to repair a section of the levee in St. John the Baptist Parish. Known as the Mount Airy Levee Project, a mile of the river-bend embankment had to be moved 1,200 feet to build a new section as replacement for the damaged portion.

Orders were for a 24-hour day and a 7-day week on the job, to beat the river's spring rampage. To make this work-schedule and its night shifts possible, the contractor relied on two Onan electric generating plants. These Model W3S units generate 3,000 watts of 115-volt, 60-cycle, single-phase, alternating current. They are powered by 2-cylinder, water-cooled gasoline engines.

Installed at the base of a 15-foot floodlight tower, one Onan plant provided current for three 1,000-watt reflector-backed lamps. The entire tower unit was equipped with heavy skids for rapid shifting about the work area. The other electric plant was mounted on a service truck. It provided power for another lighting tower, current for a Fairbanks-Morse air compressor used to service the large pneumatic tires on the earth-moving equipment, and for a number of electric tools used on the project.

W. Va. Road Building Double Pre-War Levels

Contracts awarded by the West Virginia State Road Commission during the first half of 1946 almost doubled those during the corresponding period of the last pre-war year, the Commission has reported. New construction, surface treatment, and other work totaling $5,255,901.63 has been undertaken in 46 of the state's 55 counties. In the first half of 1941, contracts were let for $3,537,633.44.

Major construction projects, delayed by war restrictions, were included in the early 1946 letting. The surface-treatment program got off to its earliest start, when the first awards were made March 26. Public Roads Administration approval is pending on the Mosey-Dothan road in Fayette County, and on the Ronceverte - Alderson road in Greenbrier.

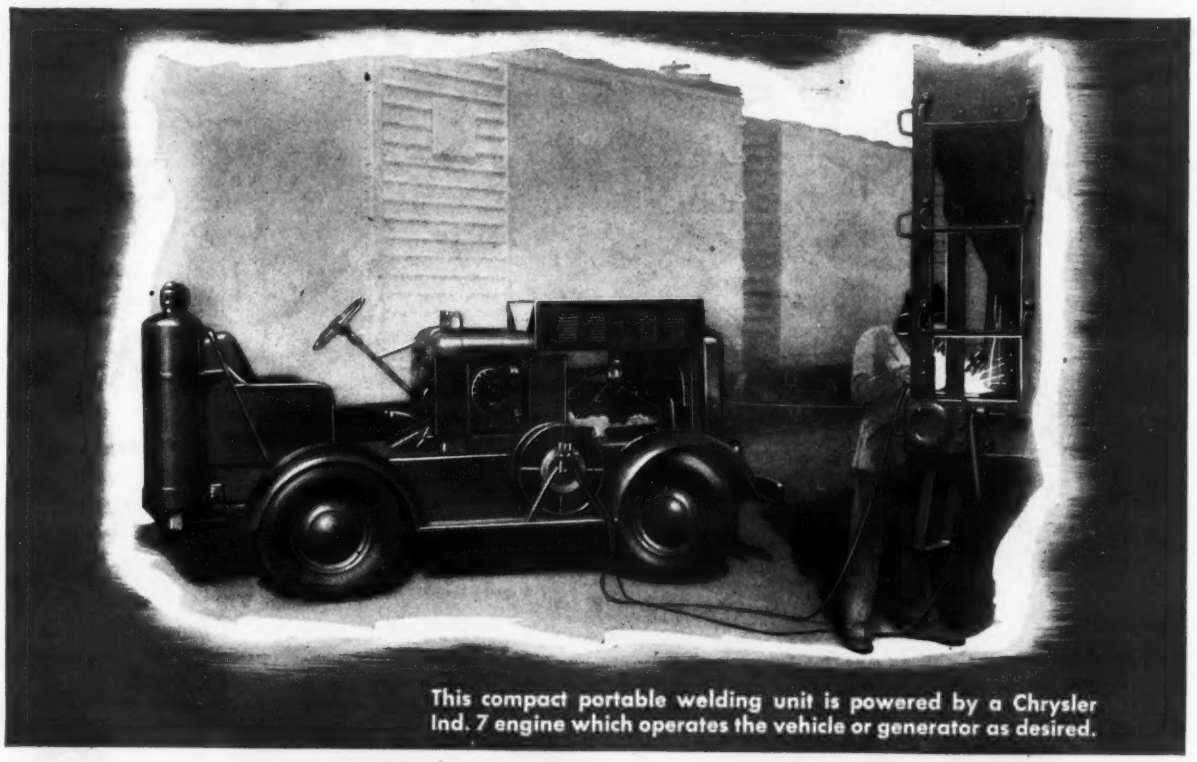
In spite of shortage handicaps, the Commission has accelerated its construction program, Commissioner E. L. Worthington reported. Projects now under way include the substructure for a new bridge across the Shenandoah near Harpers Ferry; a new bridge and relocation of U. S. 40 at Leatherwood, Wheeling; the relocation of U. S. 60 between Coal Mountain and Hurricane, eliminating 51 curves; and the construction of a hard-surfaced highway on State Route 16 between Pineville and Welch. All are Federal-Aid projects.

Todd Succeeds Bemis In Wire-Rope Sales Post

Emerson H. Todd has succeeded Frank W. Bemis as Sales Manager for the American Cable and Hazard Wire Rope Divisions of American Chain & Cable Co. Formerly District Sales Manager at Chicago, Mr. Todd will make his headquarters at Wilkes-Barre, Pa. George Gunther, recently returned from service with the armed forces, has been given Mr. Todd's old post.

"Now would be a very good time to have those bins painted."

A grave shortage of scrap threatens to thwart the steel industry's effort to regain high production levels. All who want steel themselves can help by starting available scrap into channels which serve the steel mills.



This compact portable welding unit is powered by a Chrysler Ind. 7 engine which operates the vehicle or generator as desired.

Chrysler Industrial Engines Power a Wide Variety of Applications

Chrysler Industrial engines are chosen by many manufacturers of powered industrial equipment because they combine high compression flexible horsepower with compactness and low weight.

These outstanding qualities broaden the range of power uses of Chrysler Industrial engines as indicated by the list shown at the right.

Chrysler Industrial engines are "Pedigreed" horsepower. For more than 13 years they have delivered economical and dependable performance—out in the field where class tells.

If you have a power problem, write to the Chrysler Industrial Engine Division or mail the coupon below for the new Chrysler Industrial Engine catalog.

Some Applications of Chrysler Industrial Power:

Arc Welders	Industrial Lift Trucks
Air Compressors	Industrial Pumps
Booster Pumps	Industrial Tractors
Concrete Mixers	Mechanical Shovels
Cranes	Motor Coaches
Crane Carriers	Portable Sawmills
Crane Loaders	Portable Well Drillers
Farm Tractors	Road Rollers
Fire Pumps	Self-propelled Farm Combines
Fuel Oil Pumps	Soil Pulverizers
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Horsepower with a Pedigree

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8

Keep On

BUYING BONDS

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DON'T SKIMP!

Jersey Dealer Expands; New-Equipment Rentals

Organized two years ago as a construction and industrial supply firm in Newark, the H. J. Zoubek Co., now in Hillside, N. J., has been undergoing rapid expansion. It has entered the machinery field, and hopes soon to have a complete line of new machinery for rental. The firm, which serves northern New Jersey, is exclusive distributor for Le Roi air compressors, Barnes pumps, Stow vibrators, and Centaur HiWay mowers.

A brick-steel building was erected on the 2½-acre Hillside property last year, and plans are afoot for enlargements. The present buildings comprise 6,250 square feet of warehouse and shop area, and 1,700 square feet of office space. The warehouse and shop area are to be enlarged by another 10,000 square feet.

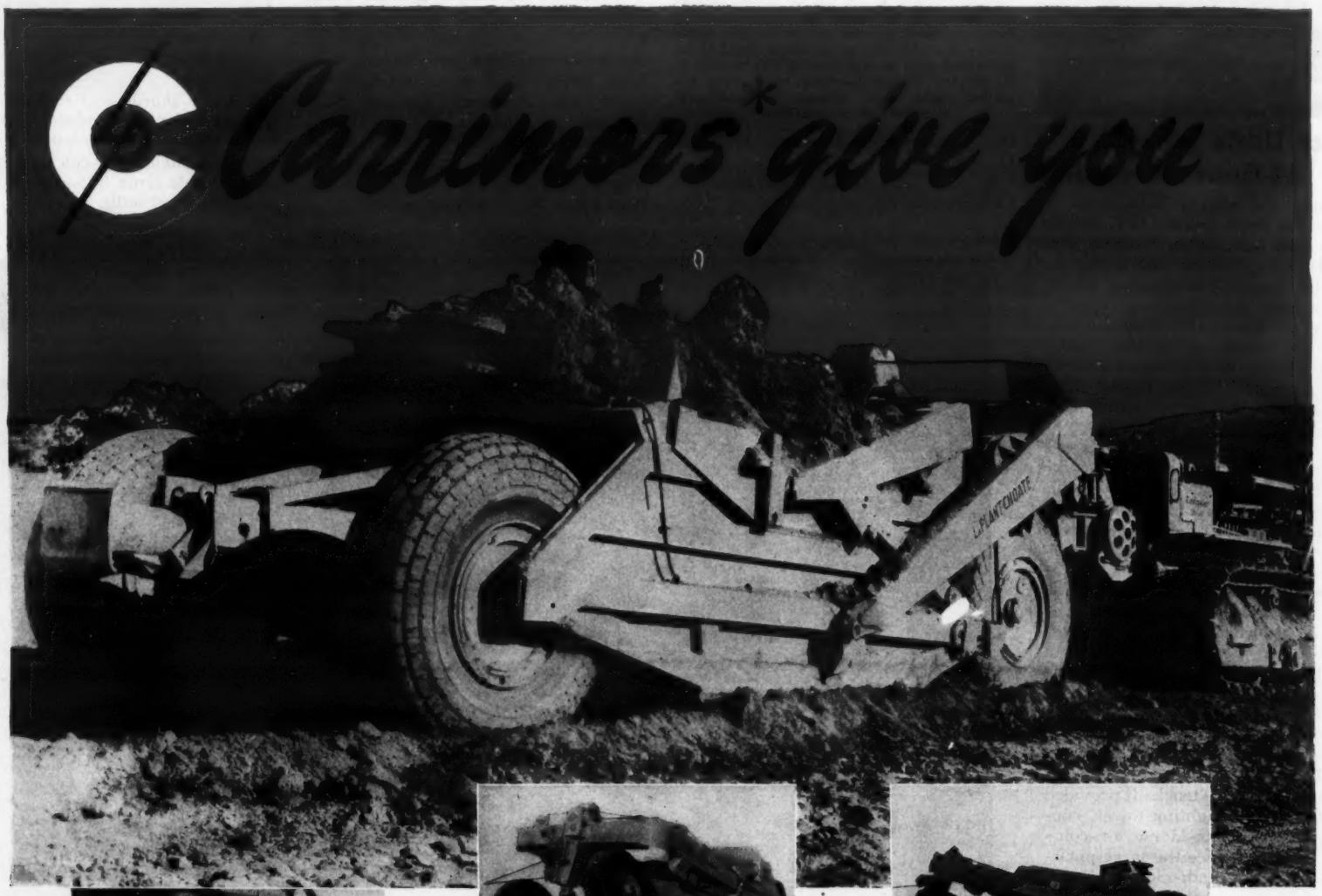
H. J. Zoubek heads the firm. T. F. Callahan, for ten years Manager of the New Jersey territory for Edward Ehrbar Inc. of Brooklyn, has assumed charge of field sales. E. L. McDowell, for some years Manager of the Dale & Rankin Rental and Service Department in Newark, supervises the shop, service, and parts aspects of the business.

Hercules Explosives

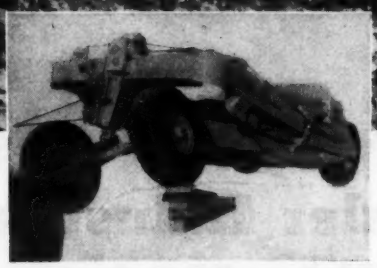
A description of the varied uses to which its explosives and chemicals are put features a brochure just issued by the Hercules Powder Co. More than 50 industries use Hercules products in the manufacture of such assorted items as paints, plastics, rubber, and insecticides.

In construction and its related fields, Hercules explosives are used in excavating, quarrying, tunneling, and similar jobs. Chemicals produced by the firm go into asphalt, cement, and concrete.

The 40-page brochure lists Hercules' products according to their family groups. Seventeen different types of explosives are presented, together with a variety of blasting supplies. Copies of the booklet can be obtained by writing the Hercules Powder Co., Wilmington 99, Del., and mentioning this report.

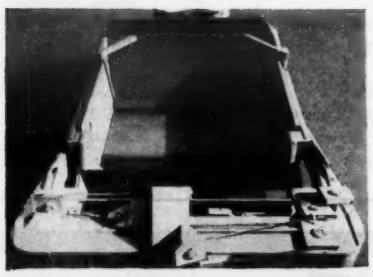


● THEY'RE "LOADING FOOLS" — Bowed offset cutting edge insures instant penetration in all kinds of scraper material. Curved bottom and low, wide bowl also make it easy to get heaped loads in a hurry. Note generous apron opening for loading without any forward movement of rear gate.



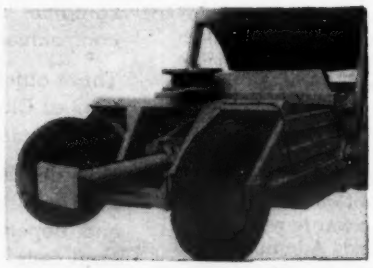
● OSCILLATING FRONT WHEELS — Provide ample clearance between front tires and frame, thus permitting "Carrimors" to load, haul and spread in almost any terrain, without damaging front tires.

● AMPLE CLEARANCE UNDER BOWL — Enables LPC "Carrimors" to negotiate steep grades and rough ground without high centering. Low center of gravity, proper weight distribution and low over-all height mean greater stability.



● OPEN TOP DESIGN—Pioneered by LPC engineers, this popular feature eliminates overhead clearance worries, increases stability and simplifies loading with shovel or dragline when scraper is used for utility hauling and spreading.

● CONTROLLED DIGGING—A simple adjustment of the hoist cable enables you to get more dig from a level position—a big advantage when you're working low spots cleaning ditches or digging stock ponds.



● RIGID GATE ALIGNMENT—Three-point gate suspension on rollers maintains perfect alignment under all conditions. Center guide post also houses gate return spring and acts as buttress for pusher block.

LaPLANTE Job-Proved

Robins Conveyors Marks Jubilee by Expanding

Celebrating its golden jubilee, Robins Conveyors Inc., Passaic, N. J., has begun construction of a new manufacturing building. The firm is a division of Hewitt-Robins Inc.

Thomas Robins, present Chairman of the Board, invented the first belt conveyor in 1891 and founded the firm in 1896. The first conveyor was built for Thomas Edison for use in cooperation with Edison - invented ore - crushing machinery.

The elder Robins, his son Thomas who is present head of the firm, and other officials attended a jubilee celebration and ground-breaking ceremonies at Passaic, on June 25. Service pins were given to 159 employees, some having up to 40 years of service with the firm.

Story of 35,000,000 Hp

The wartime and peacetime roles of the Series 71 diesel engines, used in trucks, tractors, cranes, shovels, and many other pieces of construction equipment, are described by the Detroit Diesel Engine Division of General Motors in a new pamphlet. Titled "35,000,000 Is a World of Horsepower!", the booklet discloses that over 200,000 GM Series 71 engines have been manufactured since 1938. Where these units went and what they did is recounted.

Copies of the booklet can be secured by writing the Detroit Diesel Engine Division, 13400 W. Outer Drive, Detroit 23, Mich.

Centrifugal-Pump Study

The theory and story of centrifugal pumps have been told by A. S. Marlow, Jr., in a study issued by Marlow Pumps. Comprising 20 illustrated pages, Mr. Marlow's treatise gives special attention to modern self-priming centrifugals. The operation and typical installations of these pumps are outlined.

Users of pumps interested in this study can obtain copies from Marlow Pumps, Ridgewood, N. J., on mention of this notice.

MORE of everything

more LOADability!

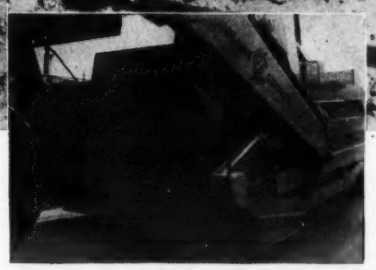
more HAULability!

more SPREADability!

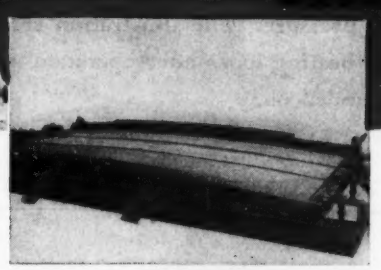
more PROFITability!

● When it comes to buying tractor-scraper rigs remember *it's the scraper that makes the money.* That's why hundreds of the nation's leading contractors are turning to job-proved LaPlant-Choate Carrimors*—the scrapers that give you more production under all conditions and *can prove it by competitive tests!* Better get complete facts today from your nearest LPC distributor. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Avenue, Oakland, Calif.

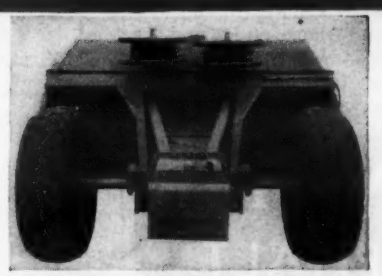
*Reg. U. S. Pat. Off.



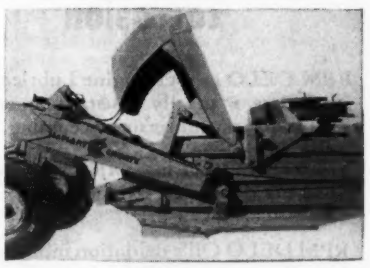
• POSITIVE FORCED EJECTION — Rear gate actually "bulldozes" all material out of the bowl, leaving the bottom and sides perfectly clean after every trip. Not only quicker and more positive but also permits using scraper as a rough grader.



• REINFORCED BOWL BOTTOM — A 2" seasoned oak plank filler between the top and bottom plates lends extra strength to bowl bottom and helps prevent permanent deflection or denting by rocks, stumps, etc.

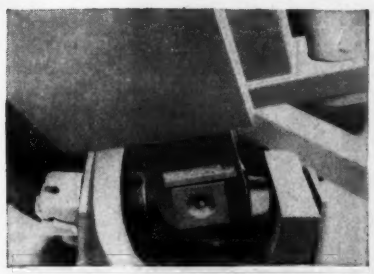


• STRONGER AND LIGHTER—Use of outboard bearing suspensions of rear axles permits stronger design without excess deadweight and provides ample clearance for oversize tires where needed for extra flotation.



• HIGH LIFTING FRONT APRON — Note how LaPlant-Choate's patented linkage arrangement lifts the front apron ahead and out of the way. No chance of jamming sticky or bulky material between the rear gate and apron.

• EASY TO SERVICE — All moving parts on the new LPC "Carrimor" are easily accessible and are designed with standard grease gun fittings. In addition, wheel bearings are easily adjusted without removing the wheels.



• ADJUSTABLE KINGPIN ASSEMBLY — Specially designed pin for taking up wear eliminates sloppy play and keeps vital kingpin assembly tight. Close-coupled universal action — lighter, stronger.

LA PLANT-CHOATE

Equipment... for Lowest Possible Cost in Moving Earth

Bridge Substructure Is Built With Caissons

(*Continued from page 1*)

It is located about a mile above the confluence of the Anacostia with the Potomac. The Victory Bridge will accommodate two 24-foot vehicular roadways, separated by a 4-foot dividing strip, and a 6-foot walk on each side.

Preparations for Construction

The Contracting Division of the Dravo Corp. set up its yard on the Anacostia near the John Philip Sousa Bridge at Pennsylvania Avenue. This is a location with both water and rail terminal facilities, being served by a siding of the Pennsylvania railroad. The yard is 1½ miles above the bridge site, but the crowded condition of the waterfront in that area excluded a choice of anything closer. A great fleet of Dravo-built equipment mounted on scows and barges was moved to the job. It included six 15-ton Dravo whirler cranes with 85-foot booms. Four of these are floating units—two on derrick-boat hulls; one on a 30 x 130 x 7½-foot barge; and one as a part of the barge-mounted concrete plant—all powered by steam. The other two, operated by electricity, work from rails on the land. As the concrete plant is also electrically driven, a small substation was built in the river on timber piles near each pier site and also on each bank. These substations are fed by a submarine cable transmission line laid across the river from the Anacostia side. It supplies 4-wire 3-phase 2,400 to 4,160-volt 60-cycle service for the electrically driven equipment and for night lighting. A Caterpillar diesel power plant is held in reserve in case anything happens to the line current.

Material is barged from the yard to the bridge site for the most part. But the steel caissons were fabricated in the contractor's Pittsburgh, Pa., plant and assembled at the Wilmington, Del., yard where the Dravo Corp. has also been engaged in shipbuilding. The floating caissons were towed to their destination via the Delaware River, Chesapeake & Delaware Canal, Chesapeake Bay, Potomac and Anacostia Rivers. At each pier location wooden stalls were built to position the caisson after the river bed was leveled off by clamshell dredging operations. The stalls were made by first driving 60 to 70-foot wooden piles, 8-inch tip and 12-inch butt, into the bed of the river. Then 12 x 12-inch wooden timbers were framed around the inside of the piles to form a horseshoe-shaped enclosure. After the caisson was admitted to the stall, the fourth side was added. The finished stall has a cluster of five piles at each corner, to which the 12 x 12's are fastened a few feet above water level, with three other piles along each long side for additional support. Knee braces of 12 x 12's are placed across the inside corners.

C. & E. M. Photo

Most of the equipment used on the substructure for the Anacostia River bridge is barge-mounted. The crane at the left is clearing the site for caisson H; the rig in the center is dredging at caisson G; and the one at the right working on caisson F.

Within the stall were driven six steel 24-inch 100-pound spud H-beams, 75 feet long, two on each side and one at each end. The spud at the open end could not be driven, of course, until after the caisson had been floated into the stall. These piles were driven to refusal by a No. 1 single-acting steam hammer suspended in swinging leads from a floating crane. The spuds are precisely spotted so that the exact location of the caisson can be held throughout the sinking.

Floating Caissons

The center caisson is 63 feet square. It serves for the circular 42-foot-diameter center pivot pier, and is alone of its kind on the project. The other caissons are like one another in dimensions. Six are 22 x 77 feet and two are 20 x 75 feet in plan. The typical river caissons resemble steel barges, but unlike a

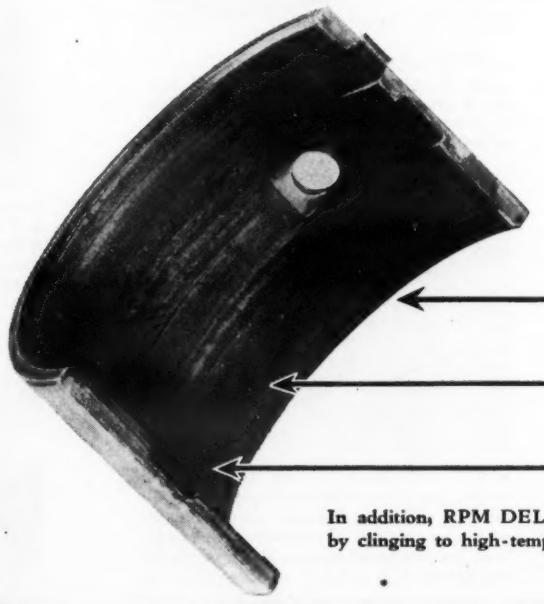
(*Continued on next page*)

CUMMER
ASPHALT PLANTS
EIGHT SIZES
Up to 1000 Tons per day
DRYERS
Two-Fire and Internal Fire
30 to 100 Tons per hour
Electric Batch Timers
50 Years' Experience
THE F. D. CUMMER & SON CO.
EAST 17th & EUCLID
CLEVELAND 15, OHIO

Diesel Engine DANGER points

Alloy bearings corroded by unstable lubricants

The high pressures and temperatures in present-day Diesel engines greatly accelerate oxidation of some lubricants. Under such conditions, these oils tend to become corrosive and attack the lead in the copper-lead structure of alloy bearings. This leaves a porous copper shell which breaks down under pressure. The illustration shows how an alloy bearing looks after operation with an uncompounded oil.



RPM DELO Oil gives bearings 3-way protection against corrosion

1. RPM DELO Diesel Engine Lubricating Oil base stocks are naturally resistant to oxidation, the cause of most lubricants becoming corrosive.
2. RPM DELO Oil is *compounded* to further reduce the danger of oxidation.
3. RPM DELO Oil's oxidation inhibitor gives bearings direct protection against corrosion.

In addition, RPM DELO Oil is compounded to prevent ring-sticking, to reduce wear by clinging to high-temperature areas most oils leave bare, to eliminate foaming.

To match the fine performance of RPM DELO OIL, use these equally efficient companion products from the same famous "RPM" line—RPM HEAVY DUTY MOTOR OIL—RPM COMPOUNDED MOTOR OIL—RPM GEAR OILS AND LUBRICANTS—RPM GREASES. For additional information or name of your distributor, write any of the companies below:

STANDARD OF CALIFORNIA • 225 Bush St., San Francisco 20, California
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DIESEL ENGINE RPM DELO LUBRICATING OIL

Bridge Substructure Is Built With Caissons

(Continued from preceding page)

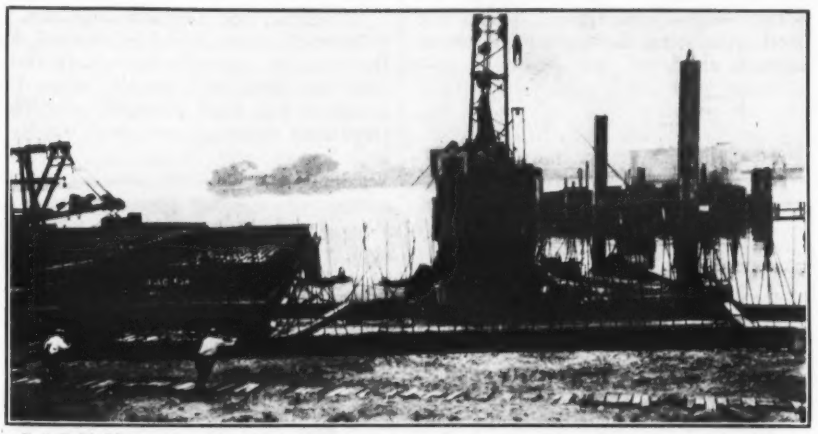
barge each has five open wells along the center line through which material is excavated. The hull is of 5/16-inch plate, 16 feet high, internally braced by three rows of wales: the first row is 6 feet 4 inches above the cutting edge at the bottom of the caisson; the center row is 4 feet 10 inches above that; and the row at the top of the caisson is 4 feet 10 inches above the center row. The wales are 18-inch steel beams, from 47 to 55 pounds to the foot. They are cross-braced with steel buntons, 12-inch steel beams 40 to 45 pounds to the foot, placed at each side of the open wells.

The five dredging wells in six of the caissons are 10-foot-diameter tubes. They extend from the top of the 6-foot-high working chamber to a point well above the outer "skin" of the caisson. From the ends of the tubes the bottom of the caisson slants downward and outward to the steel cutting edge. This is made up of a 10 x ⅞-inch plate welded in place to a 6 x 6 x ⅞-inch angle. Each of these caissons, up to this point, weighs 80 tons not including the concrete which is later poured into the opening between the outer shell and the tubes. The caisson for the pivot pier has 16 tubes of 13-foot diameter, arranged in a square pattern with 4 rows of 4 tubes.

Sinking the Caissons

The position of the floating caissons within the stalls is checked carefully by triangulation from base-line points on the shore, while they are being sunk to founding level. For the two shore piers, the founding levels are minus 45, while the other caissons are sunk to levels of minus 60 down to minus 90. At the bridge site the center of the river is about 25 feet deep. Below the river bed the soil is composed of strata of red mud, sand and gravel, and clayey sand in varying thicknesses. No rock was encountered with borings going below minus 150-foot elevation. The position tolerance requires that the tops or bottoms of the finished caissons do not vary more than 12 inches in any direction from their correct horizontal position. It also requires that the center line of the caisson be inclined from the vertical not more than 18 inches in its total height. As the caissons sink and additional sections are added, other controls described later in the article are imposed.

The initial concrete pour in the caisson is about 5 feet deep. Subsequent pours finally sink the caisson to the river bottom. The material is then dredged out through the open-bottom wells by 1½-yard heavy-duty clamshell buckets on the floating cranes and dumped alongside the caisson or into barges. Care is exercised during dredging and sinking operations to prevent "blowing in" or inflow of material under the cutting edge. The weight of the caissons is regulated so that they settle and force the material that is to be excavated from the river bed up into the work chambers.



C. & E. M. Photo
A Dravo barge-mounted crane with an 85-foot boom sets the cutting edge of one of the 20 x 75-foot caissons in place on a prepared fill.

Above the steel caisson, which is 16 feet deep, splined sheeting is built up to the height required at each pier. The splined sheeting is of 6 x 12-inch fir from 24 to 35 feet long. It is assembled in panels 5 feet wide and attached to the interior steel bracing with ⅝ x 8-inch carriage bolts. The dredging tubes are also extended by adding flange-joint sections bolted together with a hundred ¾-inch bolts at each joint.

During the alternate dredging and concrete-pouring cycle, level observations are made on six nails, three on each side and one at each end, driven into the wood sheeting of the upper part of the caisson. These determine the inclination of the caisson. From them, methods of control are decided upon. Besides these observations, three vertical water tubes are fastened on the inside of the caisson near the top, two at one end and the third at the center of one of the sides. A connecting tube of water links these into one system. By comparing the water-level readings of the three vertical tubes on the scales to which they are secured, any tilt in the cutting edge is noted at once. This is corrected during dredging operations

(Continued on next page)

BERG

CONCRETE HI-WAY SURFACER

OLD? Yes! . . . The BERG has been on the market since 1924.

But NEW, TOO . . . . . constantly improved, until today it provides the fastest, easiest, most effective, most economical method available.

The CONCRETE SURFACING MACHINERY COMPANY

4885-4889 Spring Grove Ave., Cincinnati, Ohio

Bridge Substructure Is Built With Caissons

(*Continued from preceding page*)

by digging from one or more wells to restore the caisson to a level plane. Concrete is placed in even layers over the whole interior to minimize the tendency to tilt. The water in the dredging wells is kept at the same level in all five tubes by means of 8-inch-diameter equalizing holes. These are cut into both sides at a point 22 feet above the cutting edge.

After the first 5-foot pour, the height of concrete added in successive pours varies according to the construction of the cofferdam above. The remaining 11 feet of steel caisson is usually poured in two lifts. The sinking is carefully watched in order to maintain freeboard in the caisson; that is, the distance from water level to the top of the caisson is kept great enough so that the river has no chance of sweeping into the caisson and flooding it, should high waves suddenly arise. Each caisson has its own sinking diagram which follows the general rule that the top of concrete is never more than 23 feet below the water surface; otherwise excessive pressure is exerted by the water against the outer shell.

Concreting

Concrete is mixed on a floating plant. This consists of a 130 x 34-foot barge on which are housed twin electrically driven 2-yard mixers. The crane with a 2-yard clamshell bucket on its 85-foot boom is powered by an Erie coal-burning boiler. It feeds the 3-compartment aggregate bin which holds sand in its two outside compartments and gravel in the center. An adjoining bin stores bulk cement which is brought to the concrete plant in a barge holding eight carloads or 2,500 barrels. The cement is purchased from the Capital Lime & Stone Co. of Martinsburg, W. Va., and shipped to the yard in 25-barrel containers via the Pennsylvania railroad. The containers, 12 to a gondola car, are picked up by a crane and emptied into the cement barge. From the barge the cement is blown to the storage bin at the concrete plant. Sand and gravel are bought from the Smoat Sand & Gravel Corp., whose plant is located on the Washington shore of the Anacostia alongside the new bridge. All concreting materials are delivered to the floating mixing plant by barge at the pier site.

Batches are weighed on Howe dial scales and then emptied into either of the two mixers on the level below, a few feet above the barge deck. Water for the concrete is pumped from the river. The concrete is discharged directly into two 2-yard bottom-dump buckets placed on the deck. They are then picked up by a crane and emptied into the caissons through a hopper and elephant-trunk pipe. The pours average 350 to 450 yards, taking from 6 to 8 hours.

The weights of a typical 2-yard dry batch producing 3,000-pound-strength concrete are:

Cement	1,128 lbs.
Sand	2,432 lbs.
Gravel (1-inch to No. 4)	4,162 lbs.
Water	75 gals.

Cleaning and Sealing Caissons

When founding level is reached by the caisson cutting edge, excavation with the clamshell is usually stopped a couple of feet short of final grade. The remaining material is washed out hydraulically before the tremie-concrete seal is placed. A high-pressure jet removes all material from the interior walls of the work chamber. A well equipped pump barge is the big factor

(*Continued on next page*)

GOING STEADY...

WITH Raybestos AT THE FRICTION CONTROLS

● Steady going—that's what every contractor wants from every piece of equipment. Steady going—that's exactly what you get with dependable Raybestos friction materials.

Raybestos keeps going stronger, longer, because each material is specially designed for its job. Every application is an individual challenge to Raybestos engineers—different makes, models, types of equipment call for different frictions, varying sizes, speeds and load capacities.

Whatever the work—excavating, leveling, hauling, building—you'll have less downtime, you'll keep going steady, with Raybestos at the friction controls. See your Raybestos jobber or write for replacement recommendations that will cut your operating costs.

Raybestos
INDUSTRIAL FRICTION MATERIALS

THE RAYBESTOS DIVISION of Raybestos-Manhattan, Inc.
BRIDGEPORT, CONNECTICUT

Raybestos engineers will be glad to recommend the proper friction material for any applications.

MARTIN CARRYHAUL TRAILERS
TRADE MARK REGISTERED

MARTIN CARRYHAUL TRAILERS
"Make Hauling A Pleasure!"
Ease of loading, dependability and economical operation are three Martin CARRYHAUL Trailer characteristics which make them the leaders in the field.
Regardless of your hauling job, there's a proper size Martin CARRYHAUL Trailer to do it for you safely and economically.

FIGHT WASTE!

MARTIN MACHINE COMPANY
KEWANEE, ILLINOIS

Your "CATERPILLAR" Dealer is your MARTIN Dealer. See him for your trailer needs.

C. & E. M. Photo

A clamshell dredges from one of the 10-foot diameter wells in caisson F. It is working at elevation minus 48.

Bridge Substructure Is Built With Caissons

(Continued from preceding page)

in the caisson-cleaning operation.

This 40-foot-square sectional steel hull is outfitted with an all-purpose Gardner-Denver air compressor; a Worthington 6-inch-intake 4-inch-discharge pump powered by a Hercules engine; three transformers for stepping down the line voltage to 220 volts; and a Byron Jackson 2-stage 14 and 9 x 10-inch electric pump with a 10-inch suction and a 6-inch discharge. This last unit is used to supply water for the jet. From the 6-inch discharge line, three fire hose conduct the water to the jet pipe. Jets are of various shapes but ordinarily have a 1½-inch nozzle through which water is forced at 125 to 150-psi pressure.

After the material is dislodged, it is dredged from the tubes by the clamshell buckets. Then when the bottom of the caisson is thoroughly cleaned, the working chamber and dredging wells are sealed with tremie concrete to a height of 12 feet above the cutting edge. The concrete is poured through a 10-inch-diameter tremie pipe constructed in sections that have reinforced heavy-flange couplings fitted with watertight gaskets. From the top of the concrete seal to the distributing blocks, the wells are left open and usually fill with water.

Two Shore Piers

Caisson construction for the two piers erected on each shore of the river differed in some respects from the deep-water caissons. Because of the low, wet, unstable ground through which the caissons were to be sunk, an earth foundation was first thrown up to assure a level bearing on which the cutting edge could be placed. One site was excavated to about elevation minus 9 and then backfilled with 15 feet of sandy gravel taken from the river bed. The traveling weight of the barge crane tamped the fill to good compaction.

On top of the fill, wooden blocks were laid out in the form of a rectangle so that the 7-ton 20 x 75-foot cutting edge which was set in place by the crane would be on an even keel at the start. The steel cutting edges for the land piers are 18 inches high and taper to a 1½-inch width at the bottom. To the inside of the cutting edge, 1-inch round 8-foot-long tie bars are fastened on 12-inch centers. When the cutting edge is leveled all the way around, a wooden form using 2-inch sheeting is erected at the outside.

Wooden forms are also used for the 8-foot-diameter dredging wells in these two built-up concrete caissons. Semi-circular sections, 12 feet long, are constructed of 1 x 6's running lengthwise and held together by girts cut from 2 x 10's shaped on one side to a 4-foot radius. With these double-lapped girts set on 20-inch centers, no cross bracing is necessary. The two form halves, when placed in position, fail to meet by 6 inches along each side. A 1 x 6 is set in each of these gaps and held in place by a wooden wedge. The wooden arc sections are fastened together at each end by three ¾-inch bolts. Between these forms, lifts of concrete are poured. The vertical tie bars bond the concrete to the steel cutting edge. After a pour is completed, the bolts holding the two half form sections together are removed, the wedge knocked out, and the forms are ready for the next lift.

The form work was done in a carpenter shop set up on the Anacostia shore. The shop was equipped with a band saw; a DeWalt 16-inch circular saw; an Excelsior 21-inch drill press; and an Oster bolt-and-pipe-threading machine. Reinforcing steel for the caissons came from the Sparrow Point, Baltimore, Md., shop of the Bethlehem Steel Co.

Distributing Blocks and Piers

All caissons extend approximately from founding level to the bed of the river. There they are surmounted by concrete distributing blocks varying in height from 6 to 14 feet. The top of each dredging well is closed with a wooden form, resembling a lid, that consists of five 10 x 12's set in 6-inch recesses formed in the concrete at the top of the caisson. Over these members 2-inch wood sheeting is nailed.

On the outside of the river caissons, the 6 x 12-inch splined sheeting is left in place for the lower section. But above this point the sheeting is removed, since it extends to within the navigation clearance line and above the water.

From minus 5 elevation the pier stems will rise to a height of 45 feet above low water at the center of the bridge, with the other piers stepping down gradually. All piers will be faced with granite transported by barge from Deer Island Granite Corp. at Stovington, Maine. The pivot pier at the center of the bridge is circular; the two shore and the two rest piers for the swing span have an aperture through them which is 24 feet high x 30 feet wide; the other four river piers are built with two stems.

Bridge Approaches

A subcontract for the bridge ap-

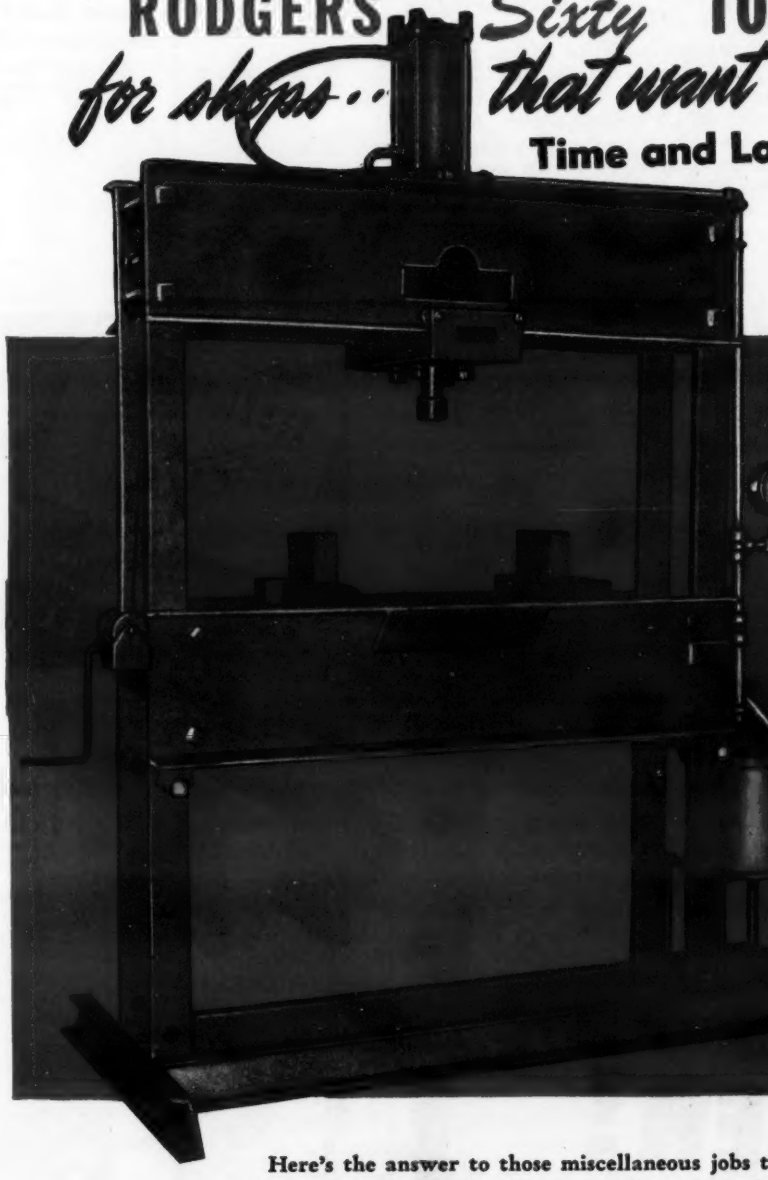
(Concluded on next page)

RODGERS "Sixty" TON SHOP PRESS

for shops . . that want to save . .

Time and Labor on jobs like:

Pressing, Shearing, Bending, Straightening, Clamping and Assembly



MOVEABLE CYLINDER
Cylinder is adjustable across top bolster—mounted on four rollers that ride the bolster channel. Ram travel 2½" per stroke of pump. Cylinder detaches from press for use as a jack, etc.

Working space on bolsters (45") permits the entrance of large gears, wheels or pulleys. 10" opening between front and back bolster.

Working daylight between top and lower bolster adjustable from 8" minimum to 38" maximum. Bolster is raised and lowered by a hand crank.

Long work may be slid through either end of the press. The opening between the columns is a full 8".

The hydraulic gauge marked in pounds and tons and the quick opening valve are located at the right side of the press for convenience.

2-Speed pump, sturdy, self lubricating. Ram moves 2½" each stroke when pump is set for high speed—giving up to 2,000 lbs. pressure in rapid travel. Flip of lever changes pump to high pressure.

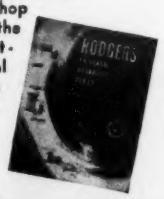
The "Sixty" requires small amount of floor space, only 38"x70".

Here's the answer to those miscellaneous jobs that often waste so much time and labor. A Rodgers "Sixty," 60 ton Shop Press is such a versatile tool that most every shop will keep it busy every day—it will pay for itself quickly. Large shops can profitably use Rodgers "Sixty's" in the tool room, machine shop and maintenance department too.

Do things the easy, time-saving way with a Rodgers "Sixty." Write for the new "Sixty" Bulletin which gives complete details.

OTHER RODGERS PRESSES

. . . are described in this catalog. Included are the Rodgers 100 ton and 150 ton Shop Presses, and the Rodgers Portable Universal Press. Write for your copy.



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HYDRAULIC POWER EQUIPMENT

Shop Presses · Crawler-Track Presses · Portable Presses · Power Pump Units

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For Over 70 Years Builders of Fine WHEEL BARROWS:

AMERICAN STEEL SCRAPER CO.

Sidney, Ohio

Bridge Substructure Is Built With Caissons

(*Continued from preceding page*)

proaches was let to the Leo Butler Co. of Silver Spring, Md. On the Washington side the approach begins on South Capitol Street at O Street. As it climbs a ramp to P Street, it consists of a fill about 250 feet long between stone-faced retaining walls. At this point a structural-steel viaduct, 1,115 feet long, carries the roadway overhead, making a curve to the left to meet the bridge proper. On the Anacostia side the approaches consist of three structural-steel ramps from 400 to 600 feet long. They terminate at their lower ends in cellular-type concrete construction between stone-faced curtain walls.

Men and Safety

The majority of the 108 Dravo workers, the average number for the project, work an 8-hour day shift. Two dredging crews also work a night shift. Safety is stressed at all times as an integral part of the job itself. Foremen are charged with the responsibility of maintaining rules of safety among their crews. The working area is posted with signs warning others than employees to keep clear of the construction.

Employees working on the river must wear a life-preserver jacket at all times. Those working in a caisson or around machinery where objects may be dropped are outfitted with hard hats. First-aid cabinets are distributed at strategic points. Light, rigid, tubular-frame stretchers with wire-mesh netting are in readiness for lowering into a caisson if the need should arise.

A glass-enclosed bulletin board on shore displays large safety posters to

C. & E. M. Photo

Prior to placing concrete seal in the caisson, all material on the interior walls is removed by a high-pressure jet. Here the jet is removed from caisson J.

catch the eye of the worker before he goes on the job. Illustrated charts are also posted to show the eleven standard signals used in the operation of a whirler crane so that misinterpretation is practically impossible. Other charts show the safe loads for chains, ranging in size by eighths from ¼ inch to 1 inch, used in lifts from the vertical through 60, 90, and 120-degree angles. Another safety feature is the sanitary dispensing of drinking water by Vortex paper cups.

The Dravo Corp. issues a monthly bulletin, *Safety News*. This lists for the firm's many divisions the number of safe hours worked, disabling injuries, days lost, and the safety rating given to each project. The rating is a combination of frequency and severity, giving frequency a weight of 60 per cent and severity a weight of 40 per cent. Frequency is based on the number of disabling injuries per million man-hours worked. Severity is computed on the number of days lost per thousand man-hours worked. The bulletin also carries a brief case history of each disabling injury, indicating the cause and how it could be prevented.

Equipment, Quantities, and Personnel

A list of the equipment brought to the project by the contractor follows:

1 tug, 125 hp, equipped with Koerting nozzle
2 wood barges for coal
8 steel all-purpose barges
2 scows
2 job motor boats
3 skiffs
1 concrete plant
3 derrick boats—steam whirler cranes
2 electric whirler cranes on rails
3 transformer substations on land
6 transformer substations on water
1 pump barge
3 electric pumps, 3-inch
1 gasoline pump, 2-inch
1 diesel-generator power plant
1 pick-up truck

The major items of the $2,487,590 substructure contract include:

Excavation (approaches)	3,000 cu. yds.
Concrete piles (approaches)	16,200 lin. ft.
Concrete (approaches)	4,190 cu. yds.
Concrete (substructures)	38,450 cu. yds.
Masonry	72,700 cu. ft.
Reinforcing steel	500,000 lbs.
Miscellaneous iron and steel	100,000 lbs.
Bronze bearing plates	570 lbs.
Treated-timber fender piles	31,700 lin. ft.

The new Victory Bridge over the Anacostia River was designed by Mojeski & Masters, consulting engineers with headquarters at Harrisburg, Pa. The architectural consultant was Paul P. Cret. The Dravo Corp., lowest of the four contractors who bid on the job, is represented on the project by R. F. Hansen, Superintendent, and Kenneth C. Cox, Engineer. A. B. Greene is Resident Engineer for the District of Columbia, assisted by J. S. Watkins. The work is being carried on under the general supervision of C. R. Whyte, Engineer of Bridges. H. C. Whitehurst, Director of Highways in the District, is representing the Commissioners of the District of Columbia and has general supervision of the project.

Three E's, Education, Enforcement, and Engineering, have been cited by Federal Works Administrator Fleming as the major factors in the campaign to reduce the traffic-death rate which exceeded 10,000 in the first four months of 1946.

Heltzel Steel Form & Iron Co., Warren, Ohio.
Send me catalog(s) indicated.

☐ B-19—Steel Highway and Airport Forms.
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☐ Put me on your mailing list for new bulletins as they are issued.

Name .....
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Steel Forms for Straight or Battered Curbs. Rigid and Flexible Radius Forms to match.

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Rigid Radius Curb and Gutter Form.

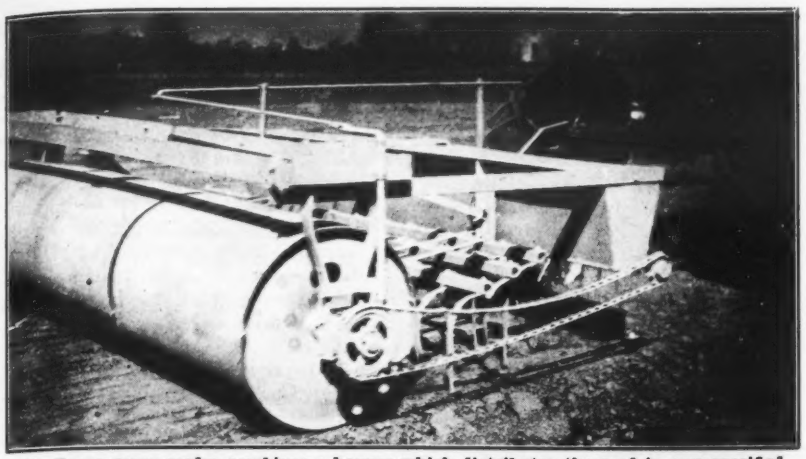
Curb and Gutter Form with Single Bottom Radius Face Curb.

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO · U. S. A.

Ford

FORD TRUCKS LAST LONGER!

Half of all the Ford Trucks now on the job are at least 9 years old!



The Byers grass seeder combines a hopper which distributes the seed in any specified quantity, a raker, and a roller in one unit. Designed for airport and roadside development work, it is said to seed 8 to 10 acres in an 8-hour day.

Seeds, Rakes, Rolls, All in One Operation

A combination grass seeder, raker, and roller developed by P. L. Byers is applicable to roadside development, airport grassing, and other maintenance problems. The machine is said to sow an excellent stand of grass, and to be useful in attaining an equalized spread of fertilizer, limestone, or other granular material.

The Byers seeder is a 3-part machine for trailing behind a tractor. It incorporates a roller, raker, and seeder. All three can be used as a unit, the raker and roller can be used without the seeder, the seeder and roller can be used without the raker, or the roller can be used just as a rolling unit, without the raker and seeder. The quantity of seed to be sown can be accurately determined for any given area. It is force-fed in front of the rake by a hopper 8 feet wide. It is then raked and rolled into the earth, and the job is done. The seed gets little chance to blow away, since the hopper is but 13 inches above ground, and bare spots in the grass-to-be are prevented by the equalized distribution, Byers says.

The machine is said to operate satisfactorily on a 2 to 1 slope. Baffle boards in the hopper keep the seed from sliding to one end. It is claimed that the seeder will cover 8 to 10 acres in an 8-hour day.

Complete specifications on the Byers grass seeder can be obtained by writing P. L. Byers, Clyde, Ohio. Mention this news item.

Boom-Tension Loads Shown on Remote Dial

A remote-indicating dynamometer, the Tens-O-Trol, has been put on the market by W. C. Dillon & Co. Used for measuring tensions and weight on cranes and booms, and in similar applications, the dynamometer helps prevent overloading. Remote-control readings, too, are now possible with the new unit.

The dynamometer, mounted on the rigging, transmits the weight by cable to the remote-indicator box. The master transmitter and the two repeater stations require no more than 12 volts dc. Illuminated 9½-inch dials on the stations show the reading. The Tens-O-Trol is very sensitive to even the slightest tensions, Dillon says. No lag or inertia is encountered, temperature does not hamper performance, and large overloads will not injure the gage.

Supplied with the dynamometer weight indicator, two repeater stations, as well as transmitter, connector, and battery cables, the Tens-O-Trol is built in sizes capable of recording capacities from 500 to 20,000 pounds. The repeater stations are built of heavy steel, and are 12 x 14 x 5 inches in size.

A bulletin describing the Dillon Tens-O-Trol electric remote indicator of tension and weight can be obtained by readers of this magazine. Mention this news item when writing W. C. Dillon & Co., Inc., 5410 W. Harrison St., Chicago 44, Ill.

Lewis Now CP President

Executive Vice President of the firm since 1931, W. Luther Lewis has succeeded H. A. Jackson as President of the Chicago Pneumatic Tool Co., New York City. Mr. Jackson, President of CP since 1918, asked to be relieved of the post. He remains, however, as Chairman of the Board of Directors, a position he has held for 14 years.

A Post-Hole Digger For Highway Fences

Some 40 to 60 holes for highway fence posts can be dug hourly with the Easy-Way digger, says its manufacturer, Standard Steel Works. Standard now markets the digger, which until recently it had been making for sale by the Adams Equipment Co.

The digging machine can be mounted on the ordinary farm-type tractor or on a jeep. It is said to dig holes 42 to 48 inches deep, with 6 or 9-inch augers. Universal joints, a removable auger bit, and a torque bar said to prevent binding of the guide shaft, are among the features of the unit. It has all-steel construction, Meehanite gears, Oil-Lite bearings, and a winch line with a 1,200-pound breaking strength.

Full details and literature descriptive of the Easy-Way digger can be secured by interested highway engineers. Write the Standard Steel Works, No. Kansas City 16, Mo., and mention this news item.

"BICKNELL BETTER BUILT"
PAVING BREAKER TOOLS

We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.
Write for descriptive circular
BICKNELL MANUFACTURING CO.
12 LIME STREET ROCKLAND, MAINE

"ON THE LEVEES" it's 81% Euclid

Down in the levee country where soft, wet borrow pits usually necessitate dragline loading of hauling units . . . where difficult haul roads and soft fills make the use of ordinary hauling units impractical . . . Bottom-Dump Euclids are the outstanding choice of leading contractors.

Of the total 30,369,500 cu. yds. let on contract * in 1945, 81% is yardage hauled by Euclids. On many of the large contracts Euclid hauling equipment is being used exclusively.

This unusual record is the result of the fine performance of Euclids on levee work for many years. Their large capacity, flotation and tractive power, and ease of handling are some of the reasons why Euclids have consistently hauled more levee dirt than other makes and types of earth moving equipment.

See your Euclid distributor for complete information and specifications on the Bottom-Dump or Rear-Dump Euclid models best suited to your particular hauling needs.

*Memphis, Vicksburg and New Orleans districts.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLID EARTH MOVERS

REAR-DUMP EUCLIDS
Capacities of 15 to 22 tons — 9.2 to 20.7 cu. yds., struck . . . loaded top speeds of 22 to 35 m.p.h. . . . powered by 150 to 275 h.p. Diesel engines.

BOTTOM-DUMP EUCLIDS
Capacities of 20 to 32 tons — 13 to 42.9 cu. yds., struck . . . loaded speeds from 26 to 34.4 m.p.h. . . . powered by 150 to 275 h.p. Diesel engines.

EUCLID LOADER
Fast loading of hauling equipment . . . makes shallow cuts to 9'6" wide . . . maximum cutting depth of 24" . . . the 54" belt is powered by 150 h.p. engine.

EUCLIDS

Beckwith Changes Staff And Adds Two New Lines

The Beckwith Machinery Co., Pittsburgh, Pa., has announced two additions to the lines it carries—Yellow Strand wire rope manufactured by the Broderick & Bascom Rope Co., and maintenance equipment made by the Gledhill Road Machinery Co.

The Gledhill units — maintainers, graders, snow plows, and black-top machinery—will augment the heavy-construction and road-building equipment handled by Beckwith. The firm has branches at Harrisburg, Wilkes-Barre, and Bradford.

The firm has also announced two staff changes. Kenneth F. Kichman, field representative since 1936, has been appointed Manager of the Harrisburg district office. Herbert J. Zukauskas, formerly with the H. K. Porter Co., has become Public Relations and Advertising Manager.

Carmichael Quits Hwy. Dept. For Project in Philippines

The resignation of H. St. G. T. Carmichael, Jr., as First Assistant Chief Highway Engineer has been announced by the Kentucky Department of Highways. He has joined Drake-Utah-Grove, a joint contracting organization engaged in Army construction work in the Philippines.

Prior to joining the Kentucky Department, Mr. Carmichael was Chief Engineer for the J. Stephen Watkins engineering organization in the building of Camp Campbell. Drake-Utah-Grove has been formed by Johnson, Drake & Piper, Inc., the Utah Construction Co., and Grove, Shepherd, Wilson, & Kruge, Inc.

The Philippine work will be under the direction of the Western Ocean Division of the U. S. Engineers with Brig. Gen. L. D. Worsham as Division Engineer.

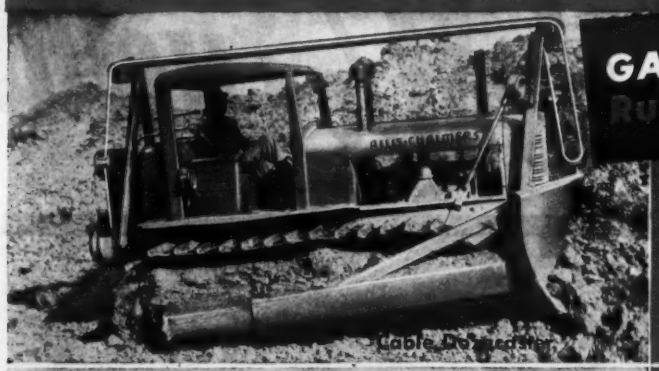
Diesels in Quarrying

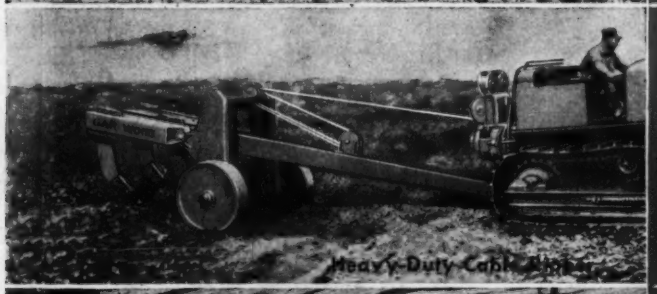
The many uses for rugged power equipment around a quarry are illustrated in a new brochure issued by the Caterpillar Tractor Co. The 8-page booklet, "Around the Quarry With Caterpillar", shows the tough-duty work which Caterpillar equipment faces in such quarry operations as stripping, stockpiling, and hauling. Diesel-driven equipment used in quarrying includes power units, tractors, crushing plants, compressors, and cranes.

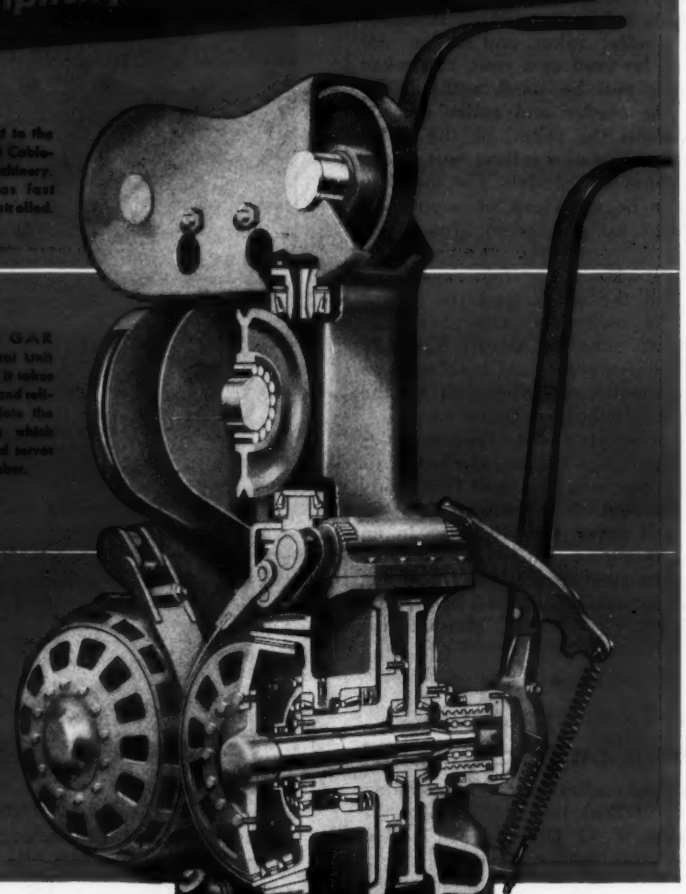
Copies of the booklet, Form 9364, can be secured by writing the Caterpillar Tractor Co., Peoria 8, Ill.

Down-to-Earth Engineering

GAR WOOD Cable Controls Feature Rugged Simplicity and Direct Action Pull







The cable goes direct to the job in GAR WOOD Cable-Controlled Road Machinery. As a result, it has fast action, positively controlled.

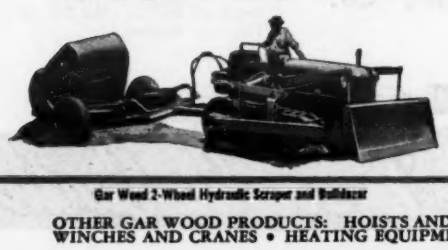
The job-proved GAR WOOD Cable Control Unit (right) has everything it takes for smooth operation and reliable performance. Note the sturdy steel housing, which prevents distortion and serves as a lubrication chamber.

Outside clutches and servo-type, self-energizing brakes seal themselves and are readily accessible. Roller bearings throughout and spur-type gears keep adjustments at a minimum.

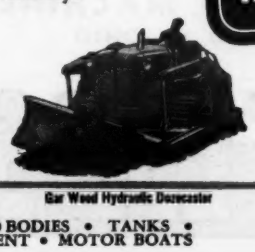
PROVED through the years on the toughest of jobs. Made more rugged than ever by the lessons learned in war action on every front, from Guadalcanal to Okinawa and from Oran to Berlin.

GAR WOOD Road Machinery and the famous GAR WOOD Cable Control Power Unit offers practical design and sound construction, well engineered and honestly built—equipment that *holds together* and can be operated with an absolute minimum of down time. *If it's* GAR WOOD, *it's good.*

See your Allis-Chalmers dealer. He'll be happy to give you all the facts and show you Gar Wood Earth Moving Equipment *on the job* in your own vicinity.



Gar Wood 2-Wheel Hydraulic Scraper and Bulldozer



Gar Wood Hydraulic Dozecaster

GAR WOOD ROAD MACHINERY WITH ALLIS-CHALMERS DIESEL POWER

Sold Through ALLIS-CHALMERS Dealers Everywhere

GAR WOOD INDUSTRIES, INC. DETROIT 11, MICHIGAN

OTHER GAR WOOD PRODUCTS: HOISTS AND BODIES • TANKS • WINCHES AND CRANES • HEATING EQUIPMENT • MOTOR BOATS

Prompt and Efficient First Aid Always Pays

Adequate Facilities, With Personnel Trained to Give Treatment, Reduce Costly Time Loss and Compensation; Helpful Free Literature Offered

✦ TO be prepared for the accident that *might* happen is insurance every contractor can, and should, afford. Prompt organized care for the injured man may mean the saving of his life. It will certainly reduce the time-consuming wasteful confusion that marks so many accidents.

Just because a project is small is no reason to disregard first-aid precautions. Accidents may happen on the small job as on the large one, and are often more disastrous because less adequate provision for care of the injured has been made. Preventive safety measures are not always enough; first aid must be ready, *just in case*.

Proper treatment rendered with the least loss of time, is the cardinal principle in first aid. For this reason, every construction superintendent and foreman should be required to have standard first-aid training. This is hardly asking too much, since the American Red Cross is always willing to make such training available.

These responsible persons should be able to give emergency treatment for shock, excessive bleeding, and fractures —generally the most serious aspects of accidents. They should also be able to cope with cases of heat prostration. To know "what to do until the doctor comes" is vitally important.

However, trained personnel must be given the facilities with which to perform their emergency duties. These facilities are two-fold: shelters, readily available, where the injured man can be treated properly; and first-aid kits, spotted throughout the project.

First-Aid Kits

Let us consider emergency kits first. We find that the Army Engineers require one kit for every 25 workers on projects that employ fewer than 100 persons. This 16-unit kit must be supplemented with snake-bite kits in snake-infested districts. On projects employing 100 to 300 men, the Army specifies portable field stations.

Kits should be distributed at strategic locations throughout the job. This not only speeds the giving of assistance after an accident. It also serves to reduce a workman's temptation to neglect some minor injury because the first-aid station is far away. Such neglect often results in far greater injury, as in the case of wire-rope lacerations that turn to blood poisoning if untreated.

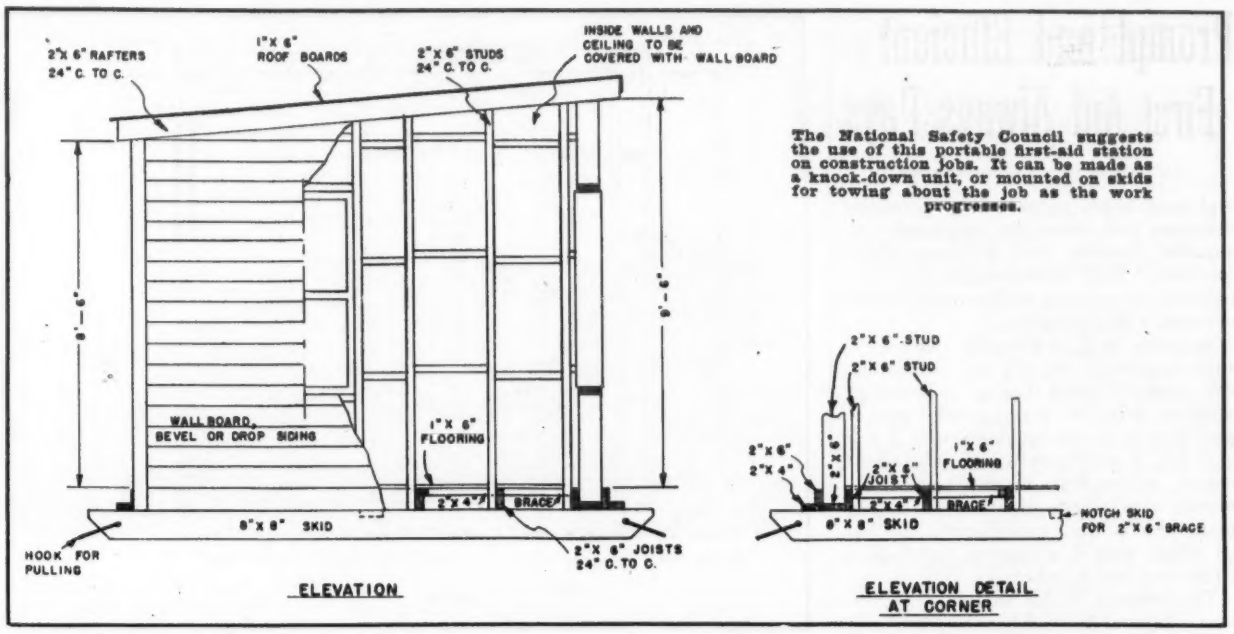
The kits should be entrusted to a responsible individual, generally the trained first-aid man or foreman, whose job it is to keep them well stocked. Loss of supplies through petty thefts is discouraged by this practice, as is dangerous self-medication. And it encourages stricter enforcement of safety regulations by the foreman, who is constantly reminded of this aspect of his job.

An Easily Built Station

As for shelters, a portable one can be built of wood by the contractor, without much trouble, the National Safety Council says. It will give privacy to the treatment, thereby discouraging the gathering of crowds and subsequent loss of work time. And, because it is portable, it can be moved along as the work progresses. A suggested plan for such a shelter accompanies this article.

A first-aid station of this sort should have at least 100 square feet of floor area, and should be about 8 or 9 feet high. It should be adequately heated

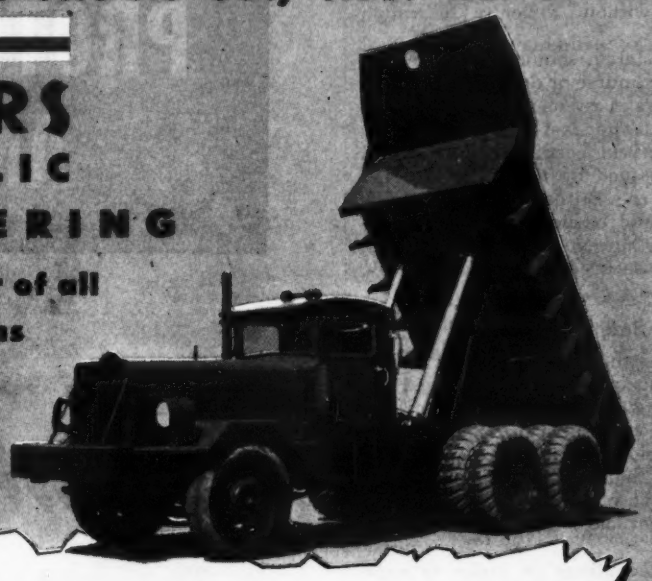
(Concluded on next page)


2"X 6" RAFTERS 24" C. TO C.
1"X 6" ROOF BOARDS
2"X 6" STUDS 24" C. TO C.
INSIDE WALLS AND CEILING TO BE COVERED WITH WALL BOARD
WALL BOARD, BEVEL OR DROP SIDING
1"X 6" FLOORING
2"X 4"
BRACE
8"X 8" SKID
HOOK FOR PULLING
2"X 6" JOISTS 24" C. TO C.
ELEVATION
The National Safety Council suggests the use of this portable first-aid station on construction jobs. It can be made as a knock-down unit, or mounted on skids for towing about the job as the work progresses.
2"X 6" STUD
2"X 6" STUD
2"X 6"
2"X 4"
2"X 6" JOIST
1"X 6" FLOORING
BRACE
8"X 8" SKID
NOTCH SKID FOR 2"X 6" BRACE
ELEVATION DETAIL AT CORNER

STERLING MOTOR TRUCK CO., INC. REPORTS:

VICKERS HYDRAULIC POWER STEERING

Relieves the Driver of all Steering Strains



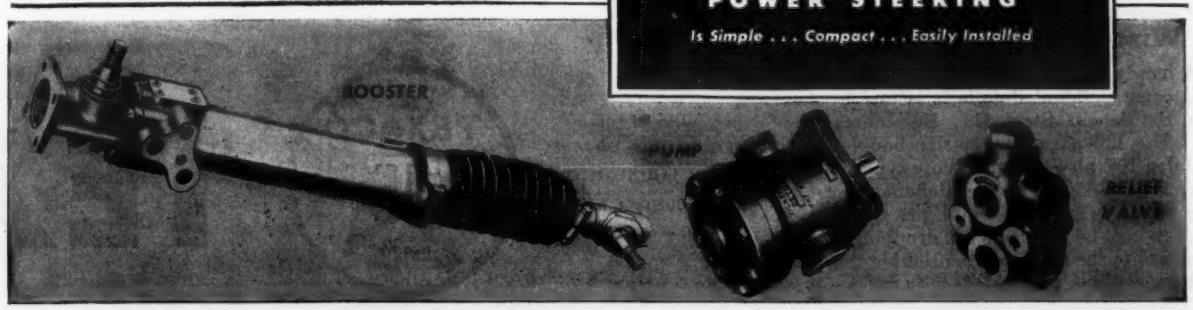
The chassis illustrated is one which has been developed for off-the-road operations and built to carry 30 ton payloads. Chassis of this type are called upon to operate over rough terrain under adverse conditions, demanding the most efficient steering mechanism available. For that reason, we equipped this chassis with the Vickers Power Hydraulic Steering Booster, which relieves the driver of all steering strains and makes it possible for him to work long hours without exerting undue effort.

This excerpt from a letter by the Sterling Motor Truck Co. mentions the advantages of Vickers Hydraulic Power Steering to the driver but it does not indicate how easily and conveniently this equipment can be applied to most existing chassis designs. The separate and compact power cylinder (booster) is connected to the drag link at one end and the chassis frame at the other; it is controlled by the pitman arm. The existing steering gear is not altered.

There are many other advantages of Vickers Hydraulic Power Steering. Write for Bulletin 44-30 which gives all the facts.

VICKERS Incorporated
1492 OAKMAN BLVD. • DETROIT 32, MICHIGAN
Application Engineering Offices: CHICAGO • CINCINNATI • CLEVELAND DETROIT • LOS ANGELES • NEWARK • PHILADELPHIA • ROCHESTER ROCKFORD • TULSA • WORCESTER

VICKERS HYDRAULIC POWER STEERING
Is Simple . . . Compact . . . Easily Installed



Prompt and Efficient First Aid Always Pays

(*Continued from preceding page*)

and ventilated, protected by screened windows and doors, and equipped with suitable lighting and drinking-water facilities. Walls and ceilings should be painted a non-toxic white, and the floor covered with linoleum.

Supplies and equipment needed in such a shelter include the following: two enamel hand basins, a bandage scissors, iodine in a stoppered bottle, 1 and 2-inch sterile bandages and 2 x 2 and 4 x 4 sterile dressings, absorbent cotton, a foot rest, ¼ and 1-inch adhesive tape, spirits of ammonia, safety pins, applicators, tourniquets, alcohol or other wound cleansers, band-aids, stretchers, and blankets.

The location of this shelter is important. It must be readily accessible from all parts of the project, and marked by adequate directional signs. All personnel should be informed of its whereabouts. Furthermore, it should be set up in a spot where an ambulance can reach it without difficulty or rough travel.

Such a station should be manned by a registered nurse or doctor, if the project employs many men, or by a trained attendant. The last should hold at least a current certificate in standard first aid, issued by the American Red Cross or the Bureau of Mines. His duties should be limited to emergency treatment, however, and medical help should be secured as soon as possible in all cases.

Safety Summary

To repeat the salient points: The best accident insurance is, and always will be, safety education among all workers from the top supervisors on down. Make employees safety-conscious and keep them that way. Add to this a strict enforcement of all safety regulations, and accident losses will be reduced to a minimum.

Take precautions in order to cope with the accidents that do happen. See that every foreman is able to render intelligent first-aid treatment on the spot. See that he has a first-aid kit located at a strategic point in his locality. See that a shelter is available for the injured man, and that medical and ambulance service are "on call" at all times.

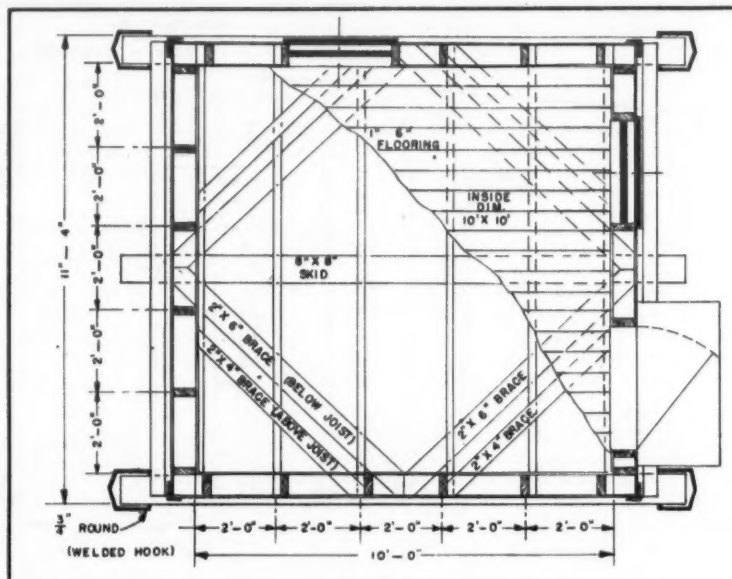
Progressive contractors find that first aid and safety "pay off" in the long run. Accident prevention and adequate treatment cut time loss on the job, and reduce compensation costs. Decent facilities for emergency aid also serve as a powerful labor-relations medium.

A first-aid information packet has been designed especially for construction men by the National Safety Council. In addition to safety and first-aid literature written for both workers and supervisors, this kit contains specification sheets for the portable field shelter described earlier and shown.

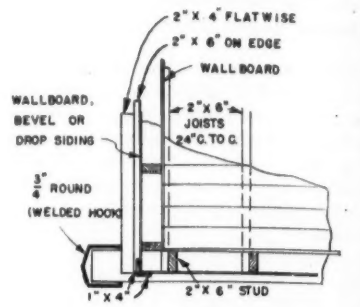
Interested construction men can obtain this valuable packet and other safety information by dropping a postcard to the Reader Service Department of CONTRACTORS AND ENGINEERS MONTHLY, 470 Fourth Ave., New York City 16, N. Y.

Wire-Rope Information

A handy handbook of wire-rope facts and constructional details is issued by the Bethlehem Steel Co., Bethlehem, Pa. The 130-page pocket-size booklet, Catalog 165, also lists the many types of wire rope produced by Bethlehem, their use, size, weight, strength, price, etc. Copies can be secured by dropping a postcard to the firm and mentioning this notice.



PLAN



PLAN DETAIL AT CORNER

Plan of an easily built first-aid station. A construction detail sheet is available on request.

PROTECTING WIRE ROPE AND OPEN GEARS

How it's done on this "Bigger Digger"

INTERNATIONAL Minerals & Chemical Corporation operate this giant dragline, said to be the world's largest, in the mining of phosphates in Florida. They say:

> *"We are using Texaco products in the lubrication of the 'Bigger Digger', and have a regular lubrication schedule posted on the machine in several places. We are using* Texaco Crater No. 1 *on hoist cables, circle rails and rollers; and* Crater No. 3 *on open gears, and hoist and boom cable drum faces."*

Texaco Crater has been used by operators everywhere for more than 30 years. *Crater* is especially designed to keep wire rope in prime condition. It fights friction, reduces wear, and prevents rust. It *penetrates* . . . preserves the core and keeps rope flexible and strong longer.

On open gears, *Texaco Crater* assures equally effective lubrication. It cushions shocks, protects against heavy loads, quiets noise, and greatly reduces wear.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS

TEXACO

TEXACO

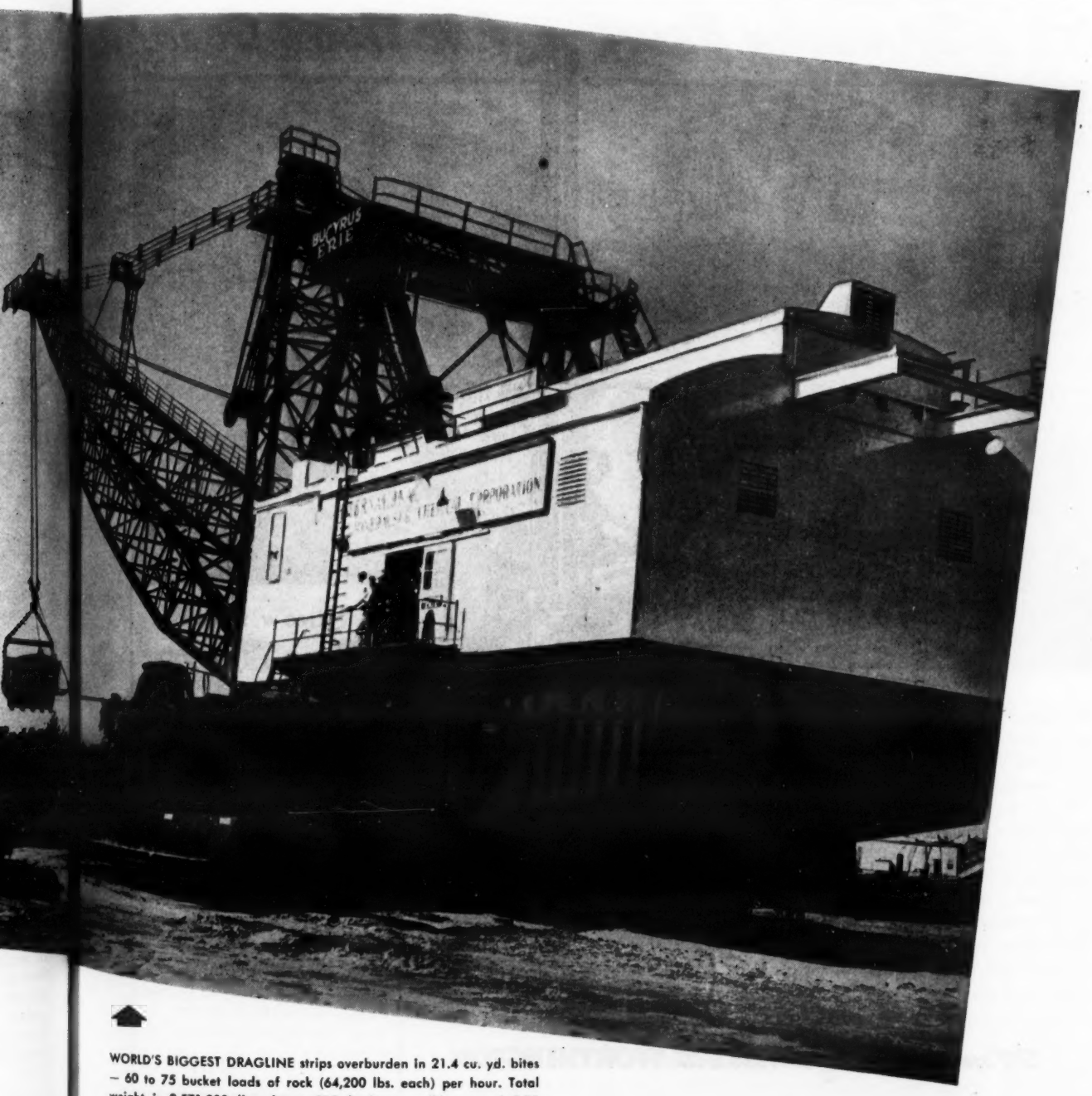
Ditch Scraper and Dump-Truck Loader

An unusual truck-loading device has been developed for maintenance work by the Cascade Mfg. Co. Known as the Scrape-Loader, it is especially useful in ditch cleaning. It is adaptable to any standard dump truck, and requires no power plant or power take-off. The loader has a 1/6-cubic-yard capacity.

The base of the Scrape-Loader is slung across the sides of the dump body, behind the cab. A boom, pivoted at its base, swings the scraper over the side. As the truck moves forward, the scraper is pulled along by a cable attached to a projecting drawbar. When filled, the scraper is raised by backing the truck. A winding drum attached to a rear wheel takes up the cable as the truck backs up. The dumping is controlled by a trip line. When the load has been dumped, the truck moves forward again, paying out the scraper, so that it lands back in the ditch in the spot from which it was lifted.

The new Scrape-Loader is especially designed for ditch cleaning.

Full details about the Scrape-Loader are available to readers of CONTRACTORS AND ENGINEERS MONTHLY. Write the Cascade Mfg. Co., 2439 N. W. 29th Ave., Portland 10, Oreg., and mention this report.



WORLD'S BIGGEST DRAGLINE strips overburden in 21.4 cu. yd. bites — 60 to 75 bucket loads of rock (64,200 lbs. each) per hour. Total weight is 2,571,000 lbs.; boom 215 ft. long; walking speed 0.11 m.p.h.; combined horsepower 1,750; largest rope diameter 2¼ in. *Wire rope and open gears are protected with Texaco Crater.*

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Discuss Headaches Of Highway Program

Costs Are Up Because of Wages, Condition of Equipment, General Business Situation, AGC-AASHO Committee Discussions Reveal

✦ WIDESPREAD problems that face the huge highway-construction program had a thorough going-over at the meeting of the Joint Cooperative Committee of the Associated General Contractors of America and the American Association of State Highway Officials in Salt Lake City, June 10. The gathering was presided over by R. H. Baldock, Oregon State Highway Engineer. Morris E. DeWitt, Chairman of the Highway Contractors' Division of AGC, is co-Chairman of the committee.

Increased costs and general uncertainty are not confined to highway construction these days, F. W. Parrott, Vice President of AGC, told the meeting. Present in all business, they result from greatly increased overhead and operating costs. Factors beyond the contractor's control have in many cases forced him to hire additional help to cope with them. He cited an example of twenty-five long-distance calls to expedite the delivery of only one carload of lumber.

Low production is not all the fault of inefficient labor, Mr. Parrott said. So many intangibles and bottlenecks hinder the work 90 per cent of the time that contractors' crews, regardless of their willingness or ability, cannot make headway. From this delay comes big overhead and lowered production.

As for the complaint that contractors hire men away from the highway departments, Mr. Parrott claimed that this works both ways. His firm, he stated, generally asks approval of the employee's superior before seeking to hire him. Rarely will the employer stand in the way of a man's advancement. Highway departments can meet outside competition for labor by paying better wages.

Increased Highway Costs

Two principal factors were listed by Mr. Baldock as contributing to the increased cost of highways. The first is increased prices. The second is higher standards of construction; that is, wider and heavier pavements, and other improvements in the interest of permanence, safety, and convenience.

Studies made in Oregon in the period 1920 to 1940 reveal that while wages have doubled, unit prices have halved, Mr. Baldock said. During and since the end of the war, however, conditions have undergone many changes involving lower production per man-hour of labor. These have been complicated further by the fact that plants and equipment are showing the hard wear of the war period and by other intangibles that slow production and increase unit costs of highways.

The discussion revealed that certain labor-agreement provisions have boosted unit costs, as have the poor condition of equipment and the lowered labor efficiency. Price controls have been ineffective in many cases and detrimental to adequate supply. Shortages are worse than a year ago. The relation between limited work hours and equipment costs has been recognized as a new factor in estimating cost.

Specifications

Instances were cited in which contractors' bid prices depend not only on the specifications but also on the particular engineer who will supervise the work, if he can be predetermined. Cases were reported in which improvement bonds were not marketable because the phrase, "It shall be done to the satisfac-

(Concluded on next page, Col. 2)

The Pony Express Field Service Unit is a portable power plant for operating small tools, furnishing light for night work, and starting heavy-duty diesels in cold weather.

Auxiliary Power Unit For All-Weather Use

Portable on-the-job power for operating various small tools, and for lighting units is furnished by the Pony Express Field Service Unit. Units of this type have been put into service as a source of auxiliary power for starting heavy-duty diesels such as are found in construction equipment. The unit comprises a generator and battery set driven by a gasoline engine, and supplies 24 volts of direct current.

The batteries act as power accumulators for the generator, which is said to produce the necessary voltage and current up to 40 amperes to keep them fully charged. Two 6-cell heavy-duty batteries are used. The generator has a 1,200-watt capacity. Power is supplied by a 3.45-hp Briggs & Stratton engine.

Complete specifications for this portable power unit can be obtained on mention of this notice. Ask Rocky Mountain Steel Products, 1370 Fall St., Los Angeles, Calif., for its bulletin.

Plastic Slide Rules, Drafting-Room Aids

Transparent acrylic plastic, Plexiglas, is now being used for drafting equipment and minutely calibrated slide rules. Used for bomber noses during the war, Plexiglas is a product of Rohm & Haas Co., Philadelphia.

When used in 10-inch slide rules made by the Pereles Bros., Milwaukee, the plastic has the calibrations molded into it during manufacture. The markings are said to defy temperature changes and humidity, and to maintain long life and accuracy.

Two time-saving drafting instruments are made from Plexiglas by the Dolgorukov Mfg. Co., Washington, D. C. These are the Hatch-Liner and the Slot-Letter. The Hatch-Liner consists of a 45-degree triangle and a small irregular octagonal center piece which fits into the central opening of the triangle and is used for doing rapid and uniform section lining. The Slot-Letter serves as a guide for freehand lettering. Lettering is done through a slot in the plastic device while reference lines engraved on the guide insure proper inclination of the characters.

Splices Welder Cables

The need to solder lugs onto broken or short welder cables in order to join them together is said to be eliminated by the cable splicer made by the Tweco Products Co. A bolt-clamp connection at each end of the splicer secures the cable ends. Solder can be run between the two clamped ends if desired. A heavy fiber sleeve covers the entire splice. Three sizes make this splicer useful over the full range of welding cables.

Complete information will be supplied by Tweco Products Co., English at Ida, Wichita 7, Kans.

Discuss Headaches Of Highway Program

(*Continued from preceding page*)

tion of the engineer", or a similar one in the specifications, made the work to be executed indefinite. Such indefiniteness of wording increases cost. Over-enthusiastic enforcement of specifications also affects costs.

The conference agreed that many changes in specifications, similar to those that have been adopted in Missouri, would be of benefit to the contractors and to the public in reducing costs. In this instance, work which could be omitted without affecting the stability or usefulness of the highway or structure was eliminated. Compaction specifications were reduced from 95 to 90 per cent. Requirements for concrete-rubbing supervision were cut, and changes permitted in the grade of reinforcing steel.

The conference conceded that considerable benefits had been gained after the Public Roads Administration had modified its policy of concurring in award of contracts, so that it no longer operated as a ceiling. J. S. Bright, PRA Deputy Commissioner for Construction, explained the agency's policies and activities. Threats to the Federal-Aid highway program were considered.

Secondary-Road Program

The greatly enlarged volume of low-cost secondary-road projects will create problems, the conference feared. Engineers accustomed to designing high-cost-per-mile projects may find it difficult to reorient their approach so that the same funds can be stretched over many more miles. Some contractors, accustomed to large dollar-volume work during the war, may refrain from bidding. And some county officials, used to proceeding with few or no preliminary plans and with the use of day labor, may continue this method.

It will be much more economical if these secondary-road projects are carried on under Federal-state supervision and performed by contract, the conferees felt.

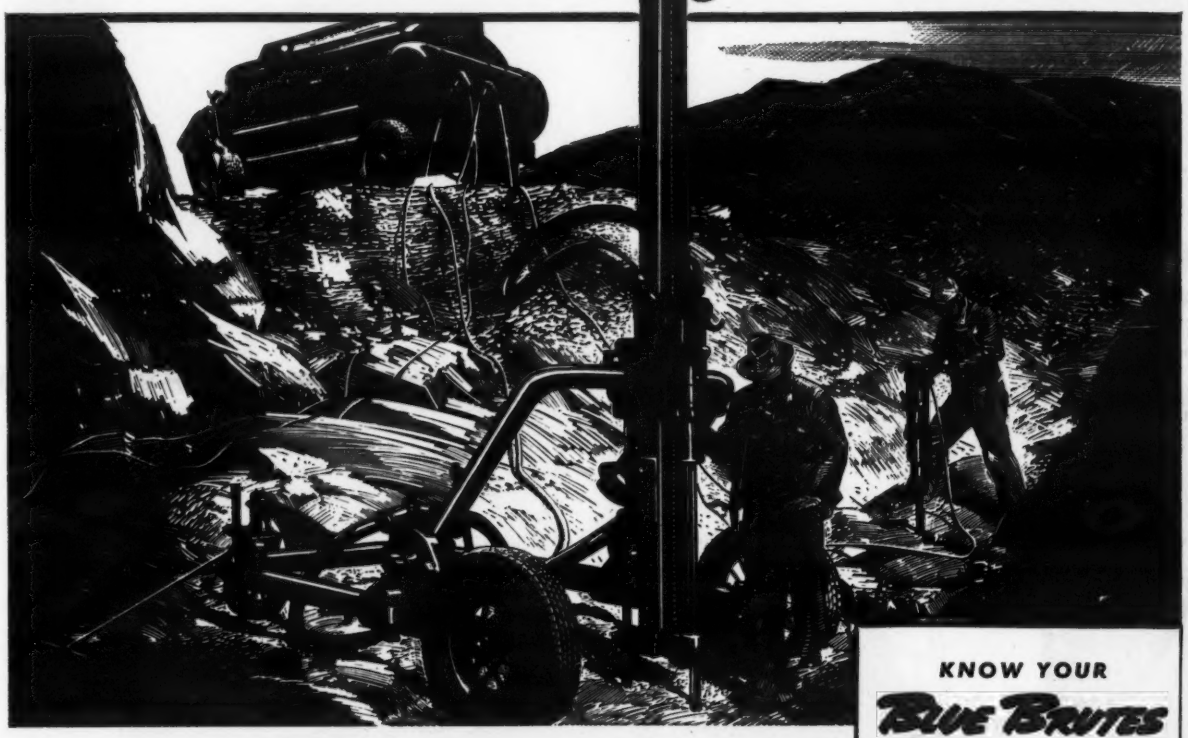
Suggestions on the use of the contract method in the PRA's access-road program were requested by Dr. L. I. Hewes, Western Chief. These low-cost-per-mile projects are to be built to Government timber stands in connection with the Veterans' Emergency Housing Program. To be built under the flag line in some cases, they entail unusual bid problems.

As outlined by Mr. Baldock, contractors' facilities should be utilized thus: clearing, drainage structures, and surfacing materials should be handled by unit bid prices; needed grading equipment and organization, on a per-day or per-hour basis.

Blaw-Knox Dealer

The Syracuse Supply Co., with offices in Syracuse, Buffalo, Olean, and Rochester, has been appointed to represent the Blaw-Knox Co. in central, western and northern New York.

IT'S A STUBBORN BRUTE AND THAT'S GOOD!



You can give this Blue Brute 315′ Compressor the toughest jobs on your books and it won't cry for help until you've got your money out of it many times over.

Take, for example, the three-point suspension of engine and compressor in a single housing — it's a Worthington feature that maintains alignment regardless of shock and vibration. Take the Worthington Feather* Valve — it will stay tight-seating and quiet for a lifetime. Take the full force feed lubrication of engine and compressor — it keeps all moving parts in constantly healthy condition. Investigate those vital features!

Teamed up with those versatile Worthington Wagon Drills (that make holes in any direction and at any angle) or other Blue Brute Air Tools, your Blue Brute Compressor will supply *more air* per gallon of fuel — and will stay trouble-free no matter how tough the going.

Make a date with your near-by Worthington distributor so that he can give you the rest of the facts that prove *there's more worth in Worthington.*

*Reg. U. S. Pat. Off. H6-4

KNOW YOUR BLUE BRUTES

Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute construction equipment will put your planning on a profitable basis. His name is listed on page 31. Blue Brutes include:

RANSOME EQUIPMENT

Pavers, Concrete Spreaders and Finishers*, Portable and Stationary Mixers, Pneumatic Placing Equipment, Truck Mixers, Plaster and Bituminous Mixers and accessories.

WORTHINGTON EQUIPMENT

Gasoline and Diesel driven Portable Compressors, Rock Drills, Air Tools, Contractors' Pumps* and accessories.

*To be announced

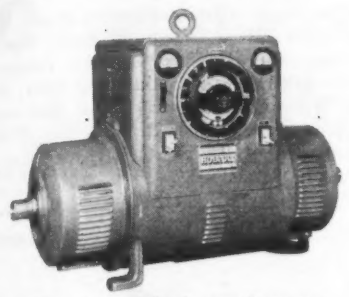
Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.



The new Hobart synchronous-motor welder can also be used as an ac generator for the operation of small tools.

New Welder Converts To AC-Generator Use

The new Hobart synchronous-motor welder is featured by an in-built separate exciter. The unit is said to be so proportioned that it can be started across the line and it will automatically synchronize itself.

The built-in separate exciter is like the one in the Hobart electric-drive welder. The new welder has a starting current about the same as a conventional induction motor of the same horsepower capacity. The firm recommends that the unit be operated to draw leading current at no load, to compensate for other low-power factor loads.

In addition to this, the welder can be used as an ac generator for the operation of small tools, lathes, grinders, etc. This can be accomplished by coupling the shaft to a gasoline engine or electric motor. The synchronous motor then becomes an ac generator. The welder's motor is a Hobart revolving-field synchronous type. When it is once up to speed, its exciter is said to build up and automatically apply correct excitation to the motor fields.

Full details and specifications for this new unit can be secured by writing Hobart Brothers Co., Hobart Square, Troy, Ohio. Mention this news item in CONTRACTORS AND ENGINEERS MONTHLY.

Friction-Materials Data

Recommendations as to the size and type of friction materials to use on worn-out clutches and brakes of construction machinery are made in a new catalog issued by the United States Asbestos Division of Raybestos-Manhattan, Inc.

Grey-Rock brake linings and clutch facings for hoists, unloaders, draglines, shovels, dredges, scrapers, concrete mixers, tractors, compressors, cranes, and many similar machines appear in the listings. The make and model of the equipment is given, together with the number and type of brake band used, its drum diameter, width, thickness, and length of lining. Clutch-facing recommendations include the drilling pattern, dimensions, number of facings required, BLMA number, and other data.

Copies of the illustrated 44-page catalog can be obtained on mention of this report. Ask for Grey-Rock Industrial Catalog 646-I when writing the United States Asbestos Division of Raybestos-Manhattan, Inc., Manheim, Pa.

Worthington-Ransome Blue Brute Distributors

See ad on page 30 for list of equipment in each line

Worthington-Ransome Distributors

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Cal., San Francisco, Coast Equip. Co.
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Minn., Minneapolis, Phillippi-Murphy Equip. Co.
Miss., Jackson, Jackson Road Equip. Co.
Mo., Clayton, The Howard Corporation
Montana, Billings, Interstate Truck & Equip. Co.
Helena, Caird Eng. Works
N.J., No. Bergen, American Air Comp. Corp.
N. M., Albuquerque, Bud Fisher Co.
N. M., Roswell, Smith Machy Co.
N. Y., Albany, Milton-Hale Machinery Company
New York, Hodge & Hammond, Ind.
N. Y., Olean, Freeborn Equip. Co.
N. Y., Syracuse, Milton-Hale Mach. Co.
N. D., Fargo, Smith Commercial Body Works, Inc.
O., Cincinnati, Carroll-Edwards Co.
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Tenn., Memphis, Independent Tractor Co.
Tex., Amarillo, T. W. Carpenter Equip. Co.
Texas, Dallas, Shaw Equip. Co.
Tex., Houston, Contractors Equip. Sales & Service Corp.
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Utah, Salt Lake City, J. K. Wheeler Mach. Co.
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Wash., Spokane, Andrews Equip. Service
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Mich., Detroit, T. G. Abrams
Mo., Kansas City, Brown-Strauss Corp.
Neb., Lincoln, Highway Equip. & Supply Co.
N. J., Newark, Johnson & Dealaman
O., Cleveland, H. B. Fuller Equip. Company
Pa., Philadelphia, Giles & Ransome
Pittsburgh, Arrow Supply Company

Worthington Distributors

Ark., Fort Smith, R. A. Young & Son
Little Rock, R. A. Young & Son
Ind., Indianapolis, Reid-Holcomb Company
Ky., Louisville, Williams Tractor Company
La., New Orleans, Wm. F. Surgi Equip. Company
Md., Baltimore, D. C. Elphinstone, Inc.
Mass., Cambridge, Field Mach. Company
Mich., Detroit, W. H. Anderson Co., Inc.
Flint, Gransden-Hall & Company
Mo., Kansas City, Mach. & Supplies Co.
N. Y., Buffalo, Dow & Co., Inc.
New York, Air Compressor Rental & Sales
O., Cleveland, Gibson-Stewart Company
Toledo, The Kilcorse Mach. Co.
Pa., Allentown, H. N. Crowder, Jr., Inc.
Easton, Sears & Bowers
Harrisburg, American Equip. Corp.
Oil City, Freeborn Equipment Company
Pittsburgh, Atlas Equip. Corp.
Pa., Phil. Metalweld, Inc.
Wilkes-Barre, Ensminger & Company
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This Link-Belt Speeder TF-4 loader is mounted on a Caterpillar D4 tractor and has a 1-cubic-yard bucket which dumps on either side.

Loader on Tractor Dumps on Either Side

Features all its own plus those of a crawler shovel, a blade scraper, and a grader are said to be combined in the tractor loader TF-4. This is Link-Belt Speeder's new Caterpillar-mounted unit. Its hoisting, swinging, and dumping are all independent of the tractor operation, and are hydraulically controlled.

This new loader's bucket has a 1-cubic-yard capacity. It can dump on either side without the tractor's being turned. Dumping speed can be regulated as desired. The bucket closes automatically, and makes it unnecessary to back the tractor. All of these features give fast digging and loading, Link-Belt Speeder says.

The loader is built on a Caterpillar D4 diesel tractor that has a wide gage and a rigid front axle. The mast swings 180 degrees at a variable speed up to 3½ rpm. The bucket can be lifted at 1¾ fps. The maximum dumping elevation is slightly over 7 feet, and the minimum, 2 feet. The bucket is 6 feet 2 inches wide. It has a swing radius of 8 feet 8 inches, and a 7½-inch cut.

Full specifications and further details about this tractor loader can be obtained by writing the Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago 9, Ill. Say you read this item.

Bert Dingley Retires

Bert Dingley, President of the Marmon-Herrington Co., has retired from that position. He has been succeeded by David M. Klausmeyer, former Plant Manager of the Chevrolet Commercial Body Division of General Motors Corp. Mr. Dingley, who will continue as a Director of Marmon-Herrington, has been in the automotive field since 1902, and has been with M-H since 1932.

New Group to Study Highway Economics

Economic aspects of highway building and maintenance were discussed when several leaders in the field gathered at Salt Lake City on June 11. The group comprised the new Committee on Economics of Highway Construction and Maintenance Methods appointed by the Highway Research Board to study various phases of highway work.

Harry J. Kirk, Manager of the Highway Contractors' Division of The Associated General Contractors, is Chairman. The meeting was informal, and plans were made for both a long-range and an immediate program of studies.

Subjects discussed included: relation of overhead to job size and safety factors in job-management practices; operating characteristics and performance rates of equipment; labor utilization; material requirements; relation of progress rates to specification and design requirements; and maintenance by contract.

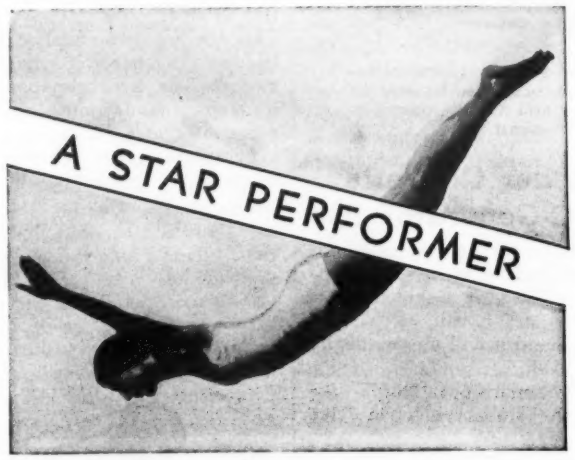
The importance of safety in construction and the need for its greater publicity were emphasized during the talks. Also, there is a definite field of activity to be undertaken on the operating characteristics and performance rates of equipment, the committee decided.

Under the subject "relation of progress rates to specification and design requirements", the following were considered as possible subjects for future study: (1) the justification of pavement joints from the standpoint of initial costs, (2) rounded slopes that require considerable labor, (3) laborious "sandpaper" finishing of slopes, (4) rubbing of concrete, (5) standardization of small drainage-structure types to permit reuse of forms, (6) elimination of headwalls on downstream ends of culverts, and (7) matching ditch widths to various equipment.

In addition to Mr. Kirk, the following members of the AGC were present: F. W. Parrott, Vice President; H. E. Foreman, Managing Director; Morris E. DeWitt, Chairman of the Highway Contractors' Division; and Directors C. V. Isbell of Reno, Carl E. Nelson of Logan, Utah, and Dan J. Cavanagh of Twin Falls, Idaho.

Others attending included: Fred B. Farrell, Chief of the Highway Cost Section, Public Roads Administration; Fred Burggraf, Assistant Director of the Highway Research Board; T. H. Dennis, Maintenance Engineer, California; Jed N. Robinson, Construction Engineer, Texas; H. L. Royden, President of the Arizona Chapter of the AGC; and Charles L. Hill, Manager of the AGC Nevada Chapter.

Unable to attend were: George W. McAlpin, West Virginia State Road Commission; Edward O. Earl, Tucson, Arizona; H. A. Radzikowski, PRA; R. M. Whitton, Missouri State Highway Commission; and J. R. Wininger, Vice Chairman of the AGC Highway Contractors' Division.



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...the logical first choice is HAISS HI-POWER. Unique for Sta-in-line reeving, out-of-the-muck sheaving. Weight placed for highest digging power, with closing ratios up to 7:1. Write for facts.
HAISS

Careful Rock Shooting Under Power Highline

With 44,000 Volts Just Overhead, Care in Blasting Needed on 3.676-Mile Job To Improve Old Road

By HOWARD V. PEHRSON,
Field Editor

✦ A 44,000-VOLT power highline runs directly above an outcropping of rock which had to be shot this spring, in preparation of a highway subgrade for surface treatment. It gave Paul R. Nichols, Construction Superintendent for the Moss-Thornton Co., Birmingham, Ala., reason to pause.

The Moss-Thornton Co. had been awarded a $111,597.25 contract by the Alabama State Highway Department. It included 3.676 miles of grading, drainage, and double surface treatment on State Route 68 between Dawson and Crossville in DeKalb County. At the start of the project at Dawson, on the right-of-way and under the power lines, lay a little area of sandrock which had to be removed.

The amount of rock to be removed was negligible, and a few good-sized charges of dynamite normally would have blown it sky-high. But there was the rub. The power line above it serves a large, mountainous area in northern Alabama. It could not be cut off, even briefly, without disrupting all types of electrical service in many rural and urban communities. It was a task calling for a careful, deliberate approach.

Blasting

Superintendent Nichols surveyed the area thoroughly and moved to the site a Worthington 160-cfm Blue Brute compressor, a Sullivan 57 wagon drill, and a Sullivan jackhammer. Holes 6 feet deep were drilled on 3-foot centers. Drilling was done with bits up to 2 inches in diameter. Although the rock was fairly soft, it was highly abrasive. One drill bit lasted for just exactly one 6-foot hole. The rock was then shot gently with Hercules explosives.

"We just shook it up a little," explained Mr. Nichols, "and then worked it out as well as we could with a bulldozer. Some of the big rocks we broke up with the jackhammer and some we snaked out with a chain on a tractor. Maybe it wasn't orthodox, but when you have 44,000 volts just a few feet overhead, your biggest thought is for safety."

Most of the sandrock broke to size quite well and could be worked out onto the subgrade with a Caterpillar D7 tractor and a LaPlant-Choate hydraulic bulldozer. The Sullivan jackhammer used with the Worthington Blue Brute compressor reduced most of the remaining rock to a size that could be handled. But in a few instances it was necessary to attach a chain to the rear of the D7 and snake out the boulders.

Early Start Backfires

Hoping to get an early start during fair spring weather, Moss-Thornton moved onto the mountain-top job in mid-March. The contractor started stripping and moving the first of the 81,100 cubic yards of unclassified excavation with two Caterpillar D8 tractors with 12-yard and 14-yard LeTourneau scrapers. During the first two months of operation, weather permitted only one-third the maximum-possible working time. Even when the sun did shine, the sand-clay soil was moist and difficult to handle.

The tractors and scrapers, however, without the use of pushers but in efficient hands, averaged more than 7½ yards of wet clay a load and slightly more than 10 loads an hour for each unit. The average scraper haul for the entire job was 550 feet. But in the biggest cut, which contained 9,408 cubic yards, the scraper haul ran as much as 2,000 feet.

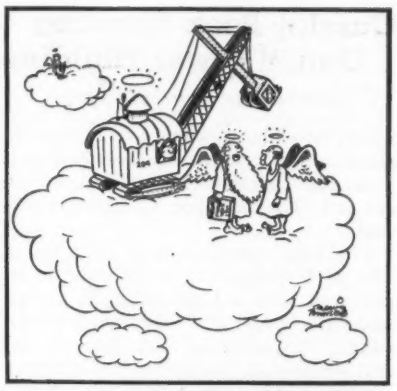
Cuts and Fills

Over the 3.676 miles of new subgrade, there were two principal cuts: one contained 9,408 cubic yards of excavation; a second, near the Dawson end of the job, extended for 250 feet at a depth of 10.3 feet and contained 5,464 cubic yards of dirt. For the most part, excavation was sand-clay, although in a few areas some rock was encountered at a depth of between 5 and 6 feet. There were several other small cuts along the road, and in almost every instance cuts and fills were well balanced. The rest of the dirt needed for the new subgrade came from side borrow.

Subgrade Preparation

This 3.676-mile stretch of new subgrade, to be given a double surface treatment this summer, follows the old highway for almost the entire distance of the project. The old Route 68 from mountain-top Dawson to Crossville was a narrow winding dirt road, long inadequate for present traffic requirements. The new section of highway has a 100-foot right-of-way with a compacted subgrade prepared over a 34-foot shoulder-to-shoulder width.

(*Concluded on next page*)



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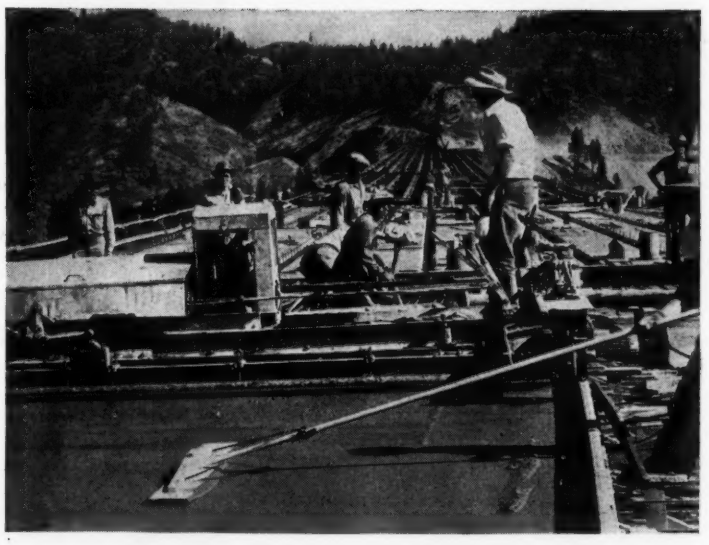
Which is why so many contractors today are turning to Bethlehem Road Steel Service. They know that the products they get will be designed and built for rugged, lasting performance. And, what's just as important these days, they know that they get service that's helpful and reliable.



RUGGED WIRE ROPE

For equipment such as shovels, dragline excavators, ditchers, cranes, etc., you can't buy a tougher or stronger rope than Bethlehem's Purple Strand, made of Improved Plow Steel. And where conditions warrant—as they often will—buy it preformed (Form-Set is our name for it) so that it's less apt to kink or loop, won't bristle, and stands bending fatigue better, thus lasting longer.

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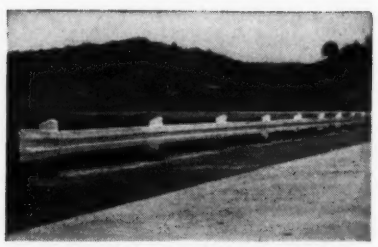
If you need drill steel, for jobs like making shot holes, buy Bethlehem Hollow Drill Steel, rolled from steel with the toughness and hardening characteristics that this type of work requires. It's suitable for both forged-on bits and for fabricated rods with detachable bits. Bethlehem also supplies Solid Drill Steel for blacksmithing purposes, such as pinch bars, moil points, chisels.



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Bethlehem produces a complete line of highway guard rail, with posts, brackets and other fittings, to comply with any state specifications. The rugged Cable Guard Rail, made of heavily galvanized strand, and the strong, resilient Cable Bracket mounted on a Bethlehem Steel Guard Post make a combination that's hard to beat. And where specifications call for even greater strength, there's the Safety-Beam Guard Rail, a smooth-surfaced, heavy-gauge steel rail which absorbs the impact of a runaway vehicle, tending to redirect it parallel to the rail. Especially adapted for bridges and bridge approaches.

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STEEL for HIGHWAYS

★ BETHLEHEM STEEL ★

Careful Rock Shooting Under Power Highline

(*Continued from preceding page*)

The new highway has 4 to 1 shoulder slopes and average backslopes of 3 to 1, except in the rock where the backslope is 1 to 1. The ditch has a 3-foot flat bottom.

The new subgrade was built up in lifts of 6 inches and compacted to 95 per cent with a Caterpillar 35 tractor and tandem LaPlant-Choate sheepsfoot rollers. A Caterpillar No. 12 motor patrol assisted in spreading and shaping the fill. The base course of pit-run gravel totals 26,800 cubic yards and tops the subgrade in two compacted 4-inch lifts.

All gravel for the base course was removed from a borrow pit in a valley 3 miles from the middle of the project, where a Lorain ¾-yard shovel loaded 12 Ford 1½-ton trucks. As the base course was laid, the Caterpillar No. 12 motor patrol again assisted in spreading and shaping before compaction with the sheepsfoot rollers.

Principal Items

Main quantity items on this project include 81,100 cubic yards of unclassified excavation; 26,800 cubic yards of pit-run gravel base course; and 234,900 cubic-yard ½-mile units of special overhaul. In addition to the dirt and gravel, the job includes 43.37 cubic yards of concrete headwalls and 867 linear feet of roadway pipe in 18, 24, 30, and 36-inch sizes. Relocation of the old road over a new right-of-way also necessitates removal of 30 structures ranging from outhouses to homes and barns.

During the summer, the newly prepared subgrade and base course will be treated with 47,400 square yards of double bituminous surfacing, liquid-sealed.

Preventive Maintenance

Although there was no field set-up for the repair of equipment, the contractor endeavored to keep the machines at productive peak by preaching careful operation and practicing preventive maintenance. The Caterpillars were thoroughly greased at least once every 10 hours with a tractor volume gun. Cable breaks—they could have been disastrous on this project, which depended on two cable-controlled scrapers as the prime movers—were held to a minimum through the use of ½-inch 6 x 19 IPS center-preformed wire rope.

Personnel

Hampered by weather and a high turnover of labor during the start of operations, the contractor hit full stride by late spring. He was then employing 4 skilled equipment operators and 15 semiskilled and unskilled laborers. They were working a 10-hour shift on each of 6 days weekly. Paul R. Nichols of Birmingham is Construction Superintendent for the Moss-Thornton Co. Supervision of the work for the Alabama Highway Department is under H. D. Burnum, Division Engineer, Decatur, and J. M. Williams, Resident Engineer. Roy Cowan, Scottsboro, is Project Engineer.

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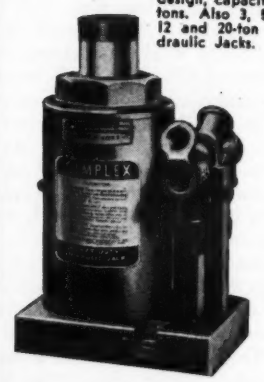

Simplex No. 50HJ Hydraulic Jack, capacity 50 tons. Low height 12", hydraulic lift 7". No. 30HJ, same double pump design, capacity 30 tons. Also 3, 5, 8, 12 and 20-ton Hydraulic Jacks.

Jobs involving the lifting of heavy loads are not manhour-eaters when Simplex Hydraulic Jacks are at hand. Smooth, speedy leakproof operation is built into these rugged Jacks. Well balanced, with convenient carrying handle that provides for easy placement. Double lever socket speeds close quarter operation. Safety is enhanced by non-deteriorating pressure seals, shielded release valve and an in-built over-load safety factor of 50%, to which each Simplex Jack is tested before shipment.

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Well Managed County Provides Good Roads

Equipment Maintained in Large Shop; Quarry and Crusher Produce Low-Cost Stone in Mercer County

✦ HISTORIC Mercer County is considered the hub of New Jersey by virtue of its central position in the state. And it can boast of an excellent system of well maintained county roads, frequent decreases in the tax rate, and a continual reduction in bonded indebtedness. This has been achieved in spite of a decline of many millions of dollars in taxable property. Key to such a desirable state of affairs lies in good management by a 7-member Board of Freeholders. Each member is chairman or head of a department in the county government. To assure a well rounded administration in each department, two other freeholders comprise a committee of three with the chairman, to shape policy for that particular department. This set-up, in which a freeholder heads one department and serves on committees in two others, makes each department aware of the needs and problems of the others.

Two other factors are prominent in the economical management of this county. One is the equipment maintenance carried on in a large shop at Trenton, state capital as well as county seat. The other is the county-operated quarry which produces, mostly with convict labor, an average of 80,000 tons of crushed stone a year. Stone over and above the county road requirements is made available to municipalities within Mercer County.

Hub County

Mercer County is more than a century old, having been created during 1838 from portions of four adjacent counties. It was named for General Hugh Mercer, physician-soldier, who was bayoneted to death at the Battle of Princeton. The county embraces 233.8 square miles. About 23 square miles are devoted to general development, including residence and business. Industry occupies about 1.2 square miles. And 181.6 square miles are under intensive cultivation. It has a population of 197,318 according to the 1940 census, with the city of Trenton accounting for 124,697 of this total.

The county is rich industrially. Its ideal situation along the Delaware River makes its capital a seaport. The industry of the county is found around this capital city, which is also close to the Pennsylvania coal fields. Here are located such large firms as John A. Roebling's Sons Co., manufacturer of wire rope, the De Laval Steam Turbine Co., Switlik Parachute Co., as well as representative firms producing pottery, brake lining, linoleum, cigars, and textiles.

With Princeton University, State Teachers College, Rider College, Lawrenceville and Pennington Schools, and Peddie Institute situated within its boundaries, Mercer County is really the educational center of the state. Historically it is famed as the site of Washington's crossing the Delaware, and of the subsequent battles of Trenton and Princeton during our Revolution.

The county may be divided roughly into two parts. The north is rolling in character, occasionally reaching an elevation of from 400 to 500 feet and producing rapid streams. It has a soil of red sandstone and shale. The southern half is flatter, largely under a 100-foot elevation, with sluggish streams and a light, loamy, alluvial-type soil.

County Organization

The seven freeholders are elected for a 3-year term of office. In succeeding years, two, two, and then three are elected so that the board will never be without experienced personnel. The members, together with the department each administers, are as follows:

William J. Steiner (Rep.) Board Director, and Revenue and Finance
Robert J. Costigan (Dem.) Public Affairs
Stewart H. O'Donnell (Rep.) Public Works
John Inglesby (Rep.) Road Repair
Peter A. Pulone (Rep.) Bridges and Culverts
John O. Gretton (Rep.) Courts and Charities
Harry Lieberman (Dem.) Engineering

Five Republicans and two Democrats make up the present board. Three members are to be elected in 1946. Harry F. Harris is County Engineer. He has nearly 30 years of service in the County Highway Department, and directs its activities as a unit.

At present the County has a total of 158 miles of roads which it has built and constantly maintains. They are divided into the following types:

Macadam, water-bound and surface-treated	63.7
Penetration macadam	31.9
Bituminous concrete	22.4
Sheet asphalt on macadam or concrete base	5.4
Concrete	27.9
Gravel, oil or tar-treated, or mixed-in-place	6.3
Vitrified brick	0.4
Total	158.0

Some of these macadam roads are over 50 years old. While some are still in good shape, others are deteriorating rapidly. They are given careful maintenance, for plenty of stone is available from the quarry for their upkeep. New road construction is done by contract, as are all oiling and tar applications. In this latter work, however, the stone is always furnished by the county quarry. Contractors submit bids for hauling it from there and laying it on the roads.

(*Continued on next page*)

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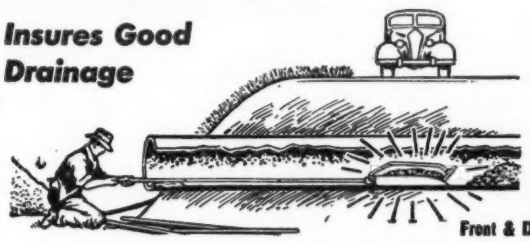
Insures Good Drainage



Restore clogged culvert pipes to service with the "Morco" Culvert Cleaner. Quick-acting, non-damaging, easy operating "Morco" is the most satisfactory tool yet developed for this work.

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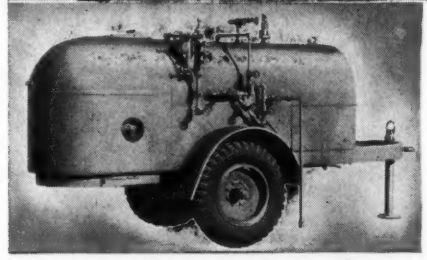
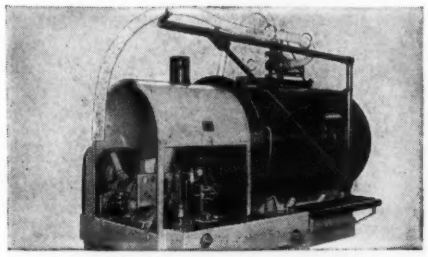


Mobile tank-car heater available in two and three tank-car sizes. Oil-fired with exclusive design four-pass flue travel; dry-coil steam condensate return under pressure—no water or heat loss.



Portable pumping booster. Heats by direct firing in one operation, loading directly to distributor, relay truck or returning to tank-car. Available in 2 sizes—truck mounting or 4 wheel trailer.

Truck mounted pumping booster in service of Oklahoma Bituminous Distributing Co., Ada, Okla.

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★ There are more Cleaver-Brooks tank car heaters and bituminous boosters in service than all other makes of similar equipment combined.

★ Service records from hundreds of owners prove Cleaver-Brooks dependability and durability. Cleaver-Brooks equipment is usually assigned to the difficult jobs—the hardest jobs—because of its known capacity and reliability.

★ The design and construction of Cleaver-Brooks heating equipment is subject to constant check—to include every feature that contributes to the most effective performance and long service life.

★ Cleaver-Brooks heaters are the "finished" product of the pioneers and originators of tank-car heaters and bituminous boosters—built by specialists in the construction of portable and stationary steam generators.

On your next bituminous heating equipment purchase you can expect to get more value from Cleaver-Brooks—qualified by experience and facilities in this specialized field.

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PIONEERS AND ORIGINATORS OF

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM-PLANTS

Well Managed County Provides Good Roads

(*Continued from preceding page*)

This year cold-patch material is being purchased after bidding has been invited, with an alternate plan available to the contractor by which the County will supply the necessary ⅜-inch stone. Two commercial plants in Trenton and one in Princeton assure brisk competitive bidding to the ultimate benefit of the County.

Maintenance Force

Rebuilding and scarifying the macadam roads is one of the chief duties of the maintenance force. This averages 45 in number, but it usually increases to 60 or 70 during the busy work season. When winter closes in, prohibiting further work, most of the crew is brought in to the shop and garage at Trenton to work at sign painting or overhaul of equipment.

Highway Department equipment includes 18 trucks of the following makes and sizes:

5 Mack, 7½-ton	2 Dodge, 1½-ton
5 Federal, 7½-ton	1 Chevrolet, ¾-ton
2 FWD, 7½-ton	1 Chevrolet, ½-ton
1 Chevrolet, 1½-ton	1 Ford, ½-ton

Road equipment includes: 2 Rome graders; 4 Huber rollers, a 10-ton, a 7½-ton, and two 5-ton, all 3-wheel type; 2 mowers, a Silver King and a Worthington; 3 tractors, 2 Caterpillars and a Cletrac; a Rogers 12-ton trailer; 2 Jaeger concrete mixers; 2 Aeroil tar pots.

County Bridges

Mercer County has more than 700 bridges and culverts. Their reconstruction and maintenance, to provide safety for modern traffic loads and volume, present a gigantic financial problem. Some are over 130 years old. The materials used in them include those of the entire field of bridge construction, such as: arches of stone, iron and steel trusses, reinforced concrete, timber, steel beams, brick, stone slabs, and combinations of several of these materials. Some of the structures are supported on piles while others are built on rock.

Construction of new bridges, as well as major repairs and painting, is done by contract. But on such painting jobs the County usually buys the paint and supplies it to the contractor. It thereby has better control of the materials used in the work. A small maintenance force does general repairs to the floors and railings, not only to county bridges but also to bridges on township roads which cross natural streams.

Maintenance of Equipment

The equipment which keeps the roads in shape must itself be kept in a good state of repair if it is to perform its function. The sprawling maintenance plant is at 480 Brunswick Avenue, Trenton. It has been handling such work at this location since 1917, when the first red brick building was erected for that purpose. Since then, additions similar in construction to the original shop have been made, in 1925 and again in 1935. Now two large buildings which front on the avenue with an entranceway between them are used for equipment repair and storage.

On the left or north side of the en-

(*Continued on next page*)

Aero Service Corp. Photo

This aerial view of the Mercer County, N.J., quarry shows the 150-foot face from which 300,000 tons of rock was taken in the most recent blast. In the center foreground are the crusher and bins. In back of them is the new 100 x 150-foot maintenance building. In this tract of land, on the Delaware River about 14 miles Northwest of Trenton, is one of the finest deposits of traprock in the State.

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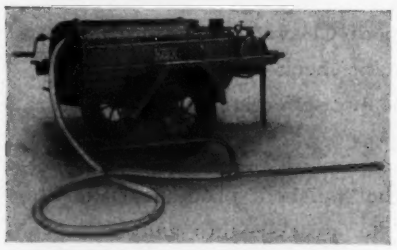

For tar and asphalt melting and spraying hot bitumen to patch roads and streets. Internal tube oil heating system produces "hot stuff" twice as fast as ordinary kettles and saves half the fuel. Tubes easy to remove and clean.

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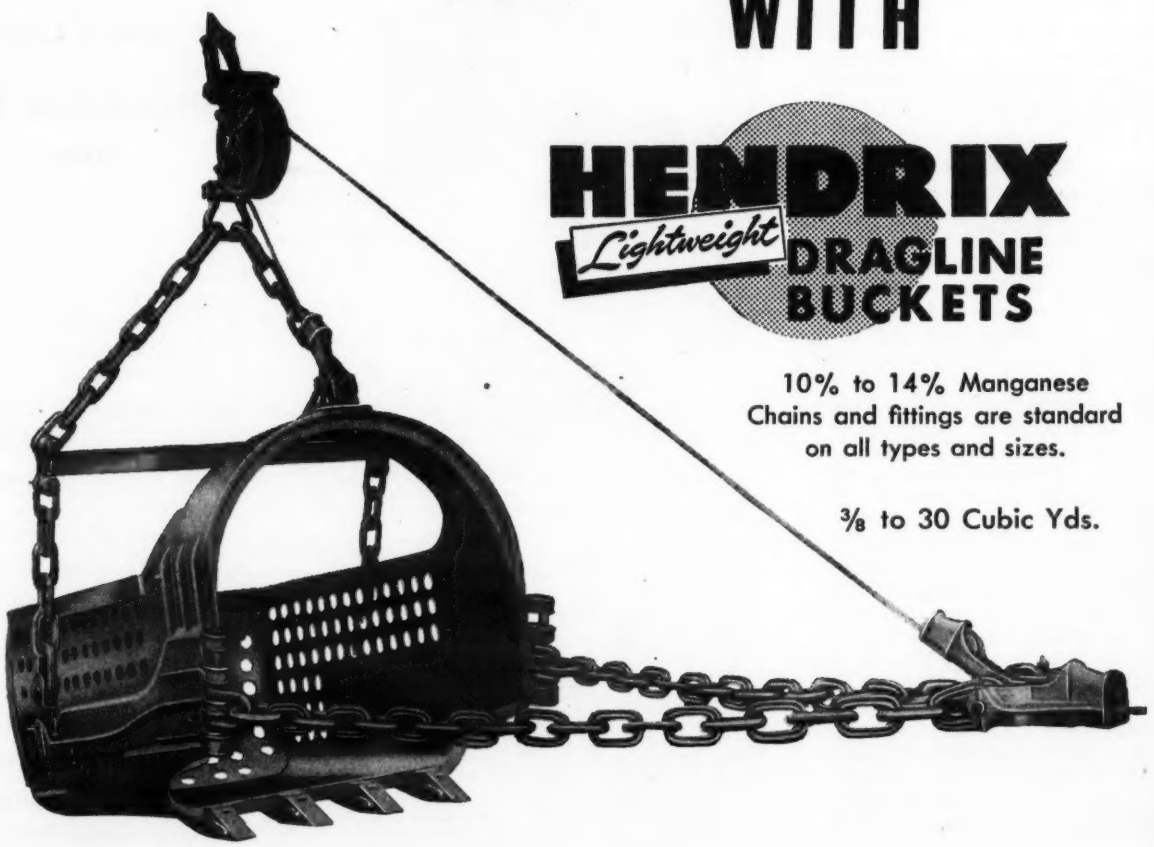

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★ Manganese Steel chains, fittings, and reversible tooth points.

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Well Managed County Provides Good Roads

(Continued from preceding page)

trance is the structure used primarily for storage. At the front it has a wing 100 feet wide x 60 feet deep, where passenger cars are kept. To the rear is a long wing, 170 x 30 feet, with nine overhead entrance doors where heavy equipment is stored.

The building at the right of the entrance has three wings. The first wing with a 60-foot front and 30-foot depth is a 2-story affair with an office and storeroom on the ground floor, and an apartment for the Superintendent upstairs. The stock room is equipped with metal shelves and bins which are enclosed by wire-mesh partitions. Connecting with this to the rear is the repair shop, 100 x 48 feet. Behind this wing is an 80-foot-square 2-story storage building. Although put up at different times, the various wings with their red brick walls, concrete floors, steel trusses, and slag-coated roofs, maintain a similar architectural pattern. Three different boilers heat the buildings; two burn coal and the other oil.

Repair Shop

Once a month all equipment is brought to the repair shop for inspection, and work is begun on anything that needs attention. A record is kept of all repairs, and also a history of each tire in the county service. Entrance to the shop is gained through four 10-foot-wide x 12-foot-high overhead doors in the north wall of the shop. One of these doors leads directly to an Oildraulic 3-ton lift which raises equipment to be greased. The shop is served by both Alemite and Lincoln lubricating equipment, powered by a Curtis 105-cfm air compressor located close to the lift. To the rear of the lift is a Manley press and a Van Dorn grinder.

A machine shop is enclosed within a 20-foot square by chicken-coop wire erected at about the center along the south side of the building. Within this enclosure is found a Steptoe No. 0 milling machine, a Thropp brake-lining machine, and a South Bend lathe with a 16-inch swing and a 10-foot bed. A G-E 5-hp motor furnishes electric power for shop equipment through a system of belts, when there are no individual motors with the units. Here also are a 1-inch vertical drill press, and a 10-foot workbench containing a 5-inch vise, a Van Dorn ½-inch portable drill, and a Champion spark-plug cleaner and tester. Another item kept here is a Hartman portable battery charger, which can charge a battery within half an hour without removing it from the car.

Along the south wall on each side of the wired enclosure is a 20 x 3-foot sheet-metal-top workbench. Each bench holds a 6-inch vise, while underneath the mechanics' tools are stored in wooden cabinets. Stored in a large locker along the west wall are such special equipment as an Echlin distributor-testing laboratory unit, an Echlin motor analyzer, a Kwik-Way valve grinder, and a Montgomery-Ward armature lathe. At the eastern end of this shop, batteries are charged on a G-E Tungar charger which has a capacity of 20 batteries at a time. Other equipment in this location includes a 4 x 3-foot forge, a 200-pound anvil, a Manbee wheel-alignment and balancing set, an acetylene-oxygen welding unit, and a Marquette portable electric arc welder. The working areas in this shop, as well as in the other sections of the buildings, are lighted by fluorescent lights.

The shop connects at the east end to the 2-story storage wing, the lower floor of which is also used for overhauling heavy equipment. Here snow plows and blades are mounted on the truck units in the winter. Diverse heavy and bulky materials such as paints, tires, and metal culvert pipes, are stored here. They are easily raised to the second floor on a 10 x 20-foot hand-operated elevator. Every year road signs are repainted in this wing.

Besides the trucks and road machinery which are maintained in this shop, 32 passenger cars and 4 station wagons are also looked after. These may be assigned to any of the nine county departments. Superintendent John Smith has four regularly assigned mechanics to handle the repairs. This force is increased during the winter when additional men are brought in from the maintenance crews to help with the general overhauling and to paint signs.

The Yard

At the front of the drive between the two rows of shops is a gas pump. There equipment is fueled and a record kept of every disbursement of gasoline and

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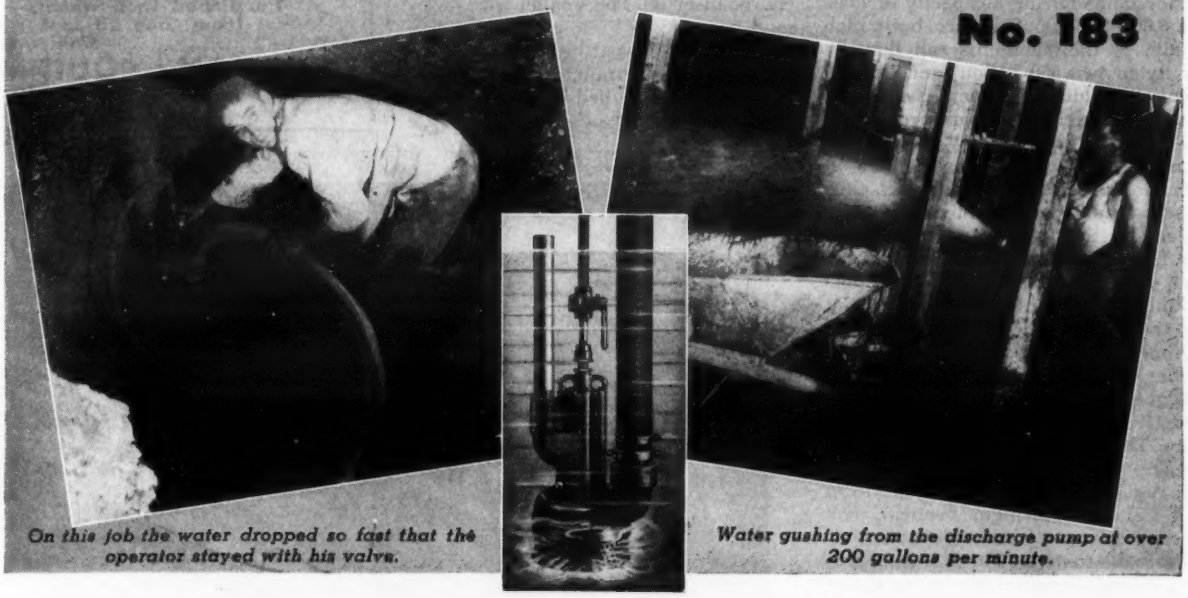
FAST PUMPING
with the CLECO-DEMING
No. 183



On this job the water dropped so fast that the operator stayed with his valve.

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Against 20-ft. Head . . . 218 Gals. per Min.
Against 30-ft. Head . . . 195 Gals. per Min.
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Maximum Head, 75 Feet

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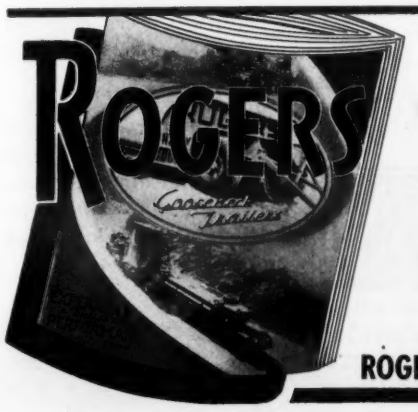

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Well Managed County Provides Good Roads

(*Continued from preceding page*)

oil. At the rear of this drive is a large storage yard. There, at the end of the winter, snow plows are removed from trucks and gone over, and snow fence is piled to be checked and painted. A siding of the Pennsylvania railroad serves the yard, and also permits the entry of tank cars bringing bituminous material for the mixing plant located there.

Bituminous Plant

Bitumen for the plant is stored in two outside tanks having a capacity of 7,000 and 8,000 gallons. They are built high enough so their contents can flow by gravity to two 550-gallon tanks within the plant building. The plant is of sheet-metal construction with a concrete floor. It is equipped with an IBW 22-hp coal-burning boiler which heats the coils in both the inside and outside tanks, thus speeding the flow of bitumen. A Kinney 2-inch electric pump can send the bitumen from the smaller tanks back to the large storage tanks, pump it to tar pots waiting in the yard to be filled, or pump it to the second floor of the plant where it is measured in a drum before being discharged into the mixer.

Aggregate for the mix is trucked 14 miles from the county quarry to the plant. There it is end-dumped into a hopper just outside the plant. A feeder and regulator direct the stone to a Link-Belt 60-foot-high, vertical, enclosed, continuous bucket elevator. This deposits the material into a 2-compartment 120-ton-capacity bin at the top of the plant. This equipment can store 20 tons of stone an hour.

The stone and bitumen are mixed in a Ransome 18-cubic-foot mixer. Its drum is heated by two kerosene torches to prevent the material from sticking to its sides. An average of 3,500 to 4,000 tons of cold patch a year is mixed at this plant. If the County is successful in obtaining a mixer of the pugmill type, it hopes to carry on some black-top paving operations with its own forces since its supply of stone is good and practically inexhaustible.

Stone Quarry

In 1892, the County purchased 100 acres of ground on the Delaware River about 14 miles northwest of Trenton. The tract lies about midway between Titusville and Lambertville, just above where Washington made his historic crossing of the river on Christmas night, 1776. Here is located the penal institution known as the Mercer County Workhouse and Farm. The ground for the farm is fertile, high, and well drained, while the quarry is located on one of the finest deposits of traprock in the state. The stone is particularly adapted to road building. There are also excellent transportation facilities available for deliveries, as canal, railroad, river, and highway all pass the site. An additional 100 acres has since been added.

The rock is blasted from a 150-foot face. The last big blast took place in 1943 when 25 tons of dynamite were fired at one shot. This provided about 300,000 tons of rock for the crushers to grind up into road stone. The preparation for the blast consisted of driving 5 x 6-foot tunnels 75 feet into the cliff from which laterals, 125 feet long, were opened up. The tunnels were drilled and blasted 5 feet at a time. Eleven drill holes were required with the center or break-shot hole not being loaded. The four immediate outside holes ringing the center used No. 1 delay caps; the two upper holes on the outside ring had No. 2 delays; the two lower holes near the floor had No. 3 delays; while the two holes across the center were fired last with No. 4 delays. Drilling was done with Ingersoll-Rand equipment. This included DA-30 column-mounted drills and X71 tripod-mounted drills, using 1¼-inch round drill steel with 1⅞ to 2½-inch bits.

For a 5-foot section of tunnel about 50 pounds of dynamite was required. The inside 2 feet was loaded with du Pont 40 per cent tunnel-blasting dynamite, and the remaining 3 feet was filled with tamping material. For the big blast, the amount of the charges and the length of tamping material between charges varied with the amount of rock overhead. When the rocks that were blasted out were too big for the crusher, they were block-holed; that is, three or four holes were drilled into them with Ingersoll-Rand R12 Jackhamers and a charge inserted. The smaller rocks were mud-capped.

A Marion 1½-yard shovel loads the rock into a 4-car train, each car holding 2½ yards. It is pulled by a Fate-Root-

(*Continued on next page*)

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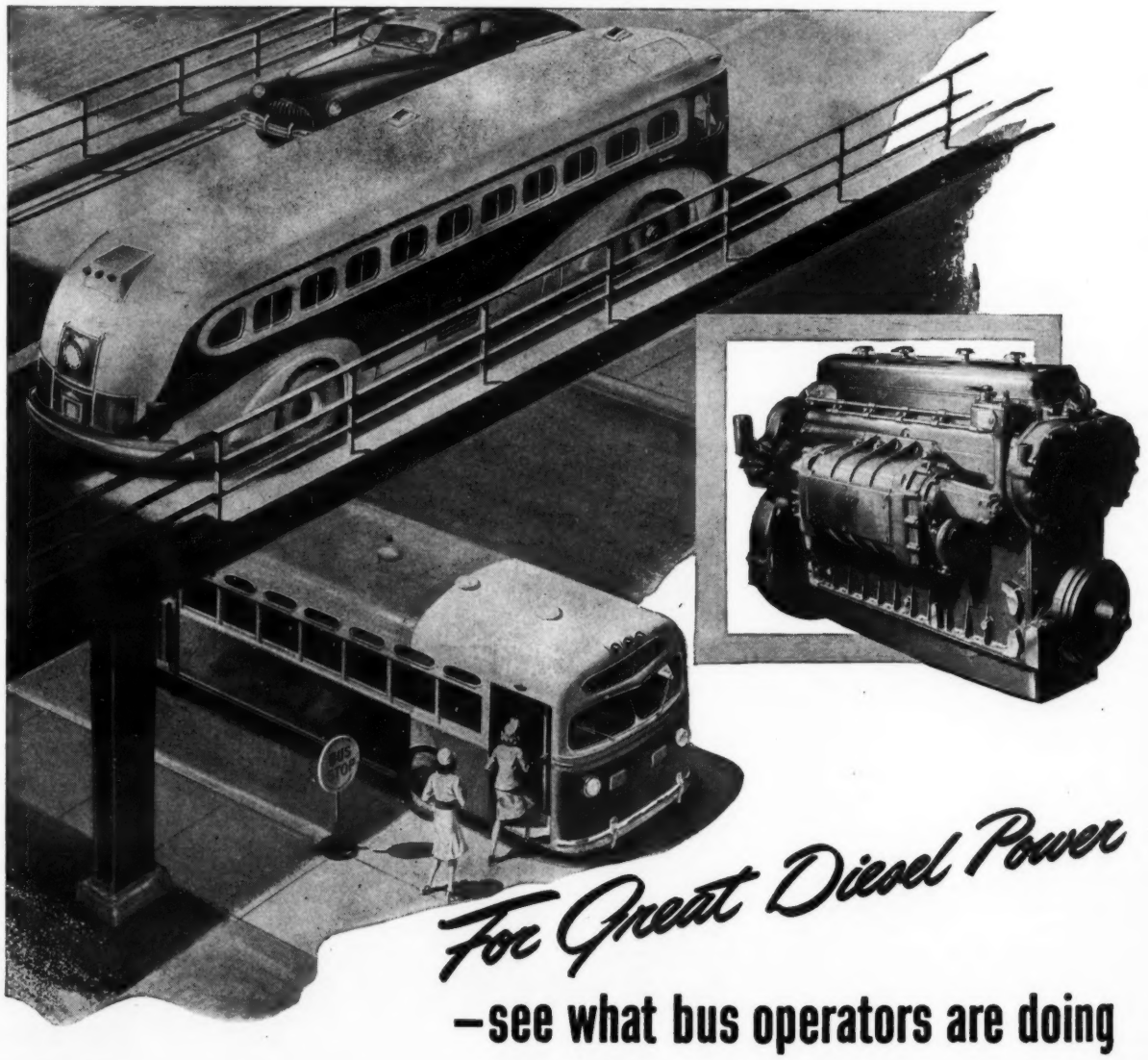

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GENERAL MOTORS

Well Managed County Provides Good Roads

(*Continued from preceding page*)

Heath gasoline locomotive operating on a 36-inch-gage track 600 feet in length. At the end of the run the rock is unloaded into a hopper which feeds the primary unit—a Farrell Bacon 24 x 36-inch jaw crusher. From here the stone ascends a 35-foot bucket elevator to an Allis-Chalmers 4 x 12-foot low-head vibrating scalper screen. The rejects are crushed further by a Symons 4¼-foot cone crusher. They are then passed by an elevator to three Allis-Chalmers 4 x 12-foot sizing screens. Five decks on these three screens produce six sizes of stone; dust, ⅜, ½, ¾, 1½, and 2½-inch.

The six grades of stone are collected in six bins, each with a capacity of 50 tons. From there they are dumped into two Mack trucks, 7 and 15-ton, and hauled to the stockpiles adjoining the crusher. Two Link-Belt cranes with 1-yard Page clamshell buckets handle the material and keep the stockpiles in shape. Working with 8 staff mechanics and from 30 to 35 convicts, the plant averages 500 tons of stone in a 10-hour day. The normal yearly production of the plant is around 80,000 tons, with a shutdown of about three months in the year because of inclement weather. Adolph D. Zickwolf is acting Warden of the institution and Horace N. Dickey is Quarry Superintendent.

Maintenance Building

A new maintenance building, 100 x 150 feet, was constructed of brick walls and steel trusses in 1930. It contains equipment to service both the quarry and farm machinery. Heavy units are moved easily about by a Box 6-ton overhead crane running the length of the structure. One 75 x 25-foot section of the building is given over to a machine and repair shop. At the front end of this section, drill bits are sharpened and shanked on an Ingersoll-Rand drill sharpener. Near by is a quenching tank which holds the heated bits in a rack on top of the water. Grouped with these units are a 4-foot-diameter circular forge with a Champion blower, and a 5-inch bench vise mounted on a stand.

Other equipment stationed in this room includes a Walker-Turner ½-inch drill; a South Bend 16-inch x 8-foot lathe; a Cincinnati-Bickford ½ to 2-inch drill press; a Buffalo armorplate machine for cutting iron or light steel; a 14-inch power saw; a 1½ x 10-inch emery wheel; an oxyacetylene welding set; and a Marquette 250-amp electric welder. Along the side is located an 18-foot workbench on which are mounted two vises.

To the rear of this room is a 25 x 30-foot carpenter shop containing a workbench with vises and a Parks woodworking machine. The building also houses an Ingersoll-Rand 12 x 10-inch air compressor which supplies air for the shop, the quarry, and for the drilling.

County Planning

Fifteen years ago a master plan was developed for the county under the guidance of Russell Van Nest Black, nationally known planning consultant. It proved invaluable to the Engineering Department in programming work during the period when "made-work" projects were necessary for the relief of the unemployed.

The Board of Chosen Freeholders has thought it wise to create a new Planning Board to review the old plan in the light of new problems which have arisen since it was presented. The new Board was recently appointed and is composed of nine members. Its members were drawn from various parts of the county, and it is truly representative of such varied interests as industry, transportation, agriculture, labor, housing, engineering, real estate, county and borough officials. It will start to function immediately.

Finance

Bonds are issued by the County for capital improvements such as new road or bridge construction. But county officials feel that if the State would turn over the gasoline-tax money instead of diverting part of it, such bonding would be unnecessary. This year Mercer County received from the State Motor Vehicle Bureau $235,000, part of which went for the redemption of bonds and the rest for road maintenance. In 1937 the debt of Mercer County stood at $6,023,000, while nine years later in 1946 this had been reduced to $2,879,000, a reduction of $3,144,000. The 1945 budget showed appropriations of $243,310 for the Road Repair Department, and $53,800 for the Bridges and Culverts Department.

In trying to purchase right-of-way for highway reconstruction, the County

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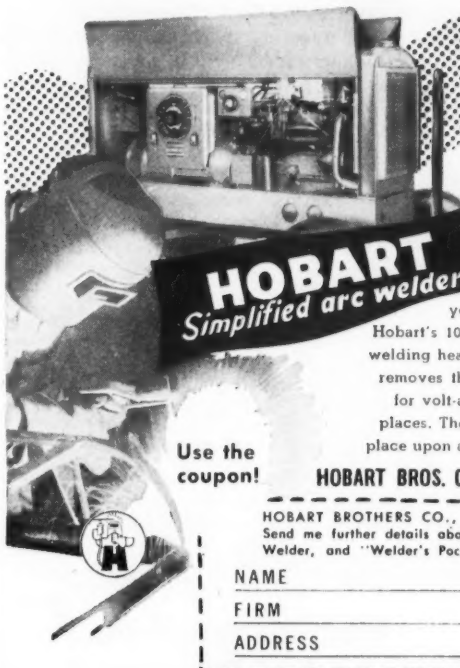

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(*Continued from preceding page*)

has met with opposition in the form of inflationary values, and it will have to resort to condemnation proceedings. Even then, high prices are expected in the course of acquiring the desired 80 to 100-foot right-of-way width. Many of the old county roads are only 33 feet within taking lines. But on new roads the Highway Department wants to establish an absolute minimum in the interests of safety—two lanes for travel and two lanes for parking. This will require a right-of-way of 60 feet, 22 feet of which will be reserved for footwalks. This objective is kept in mind when realigning a road through developed areas. In the less congested regions, wider right-of-ways are obtained.

Future Work

As part of its post-war program of public works, including roads, bridges, and buildings, the County had planned to spend $3,000,000 over a 6-year period. Part of the money was to come from Federal and state contributions. But as the expected unemployment problem did not arise, and in view of the present high prices, this program has been curtailed. A total of only half of the yearly amount, or $250,000, is expected to be spent in any one year.

The county engineering organization, which had dwindled to a skeleton force during the war, is getting back to normal strength again with 12 men now working on plans, estimates, etc. The first important job to be put on the construction agenda is an underpass beneath the Delaware & Bound Brook railroad near the General Motors Co. plant at the Trenton Airport. The Federal government has allocated $54,000 for the replacement of the old structure at that point with a new, wide, modern bridge. This work is of prime importance since the 500-acre airport, only 5 miles from Trenton, is going back to the County now that the Federal government no longer needs it for war use.

Trenton is probably the largest state capital without air service, and many of the large airlines are eager to begin operations on the county field which was developed by the CAA. The field was required for war-training purposes. But as these operations are now over, it is expected that the airport will soon be readied for commercial flying.

Personnel

Harry F. Harris is County Engineer for Mercer County in charge of all construction and maintenance operations, and Howard Klockner is Road Supervisor.

Methods for Gaging Soil Moisture Rated

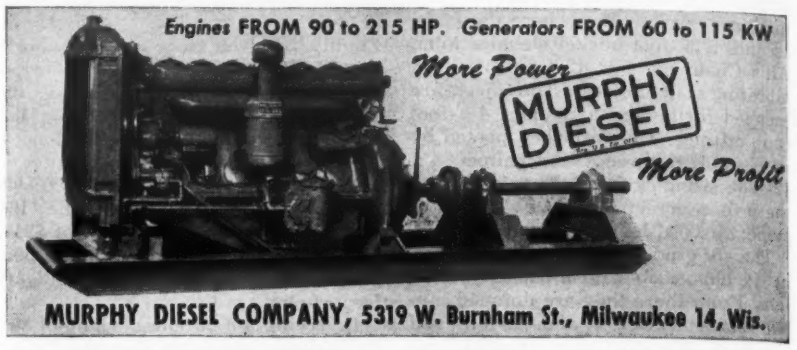
No one of the present-day instruments that measure soil moisture can be called "best", Department of Agriculture scientists reported in *Soil Science* recently. "The choice of method for measuring soil moisture should be based on differences in the conditions of measurement as well as on instrument characteristics." The investigators studied the four major methods of soil testing before rendering this decision.

Basic data on the variability of soil moisture were obtained for the tests by direct determination on oven-dried samples chosen at random. This was also one of the four methods included in the study.

The tensiometer was included, on the assumption that it gives as direct a measure of moisture potentials as random sampling does of moisture percentages. But it is decidedly limited in usefulness, the report indicates. It renders its best performances in a range of higher moisture contents.

Gravimetric plugs were found the most suited to accurate measurements under the majority of soil conditions. Resistance blocks "are best adapted to semi-quantitative measurements of the variable field moisture of large areas under conditions which do not require the improved accuracy that can be obtained by temperature corrections."

Carried out by C. S. Slater and J. C. Bryant, the research has been digested in a recent issue of *Highway Research Abstracts*, published by the Highway Research Board, 2101 Constitution Ave., Washington, D. C.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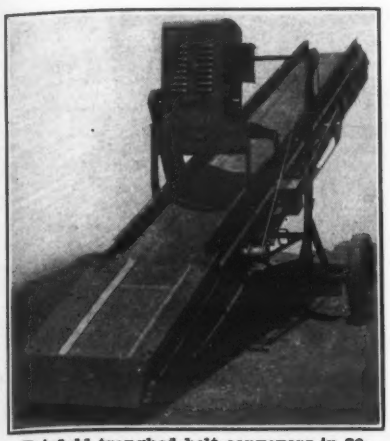
KOTAL Master Mixes
The Advanced All-Weather Aid in Building Better Roads



Fairfield troughed belt conveyors in 30-foot lengths, with side boards and cleats, are once more in production.

Troughed Conveyors Are Again Available

The production of troughed belt conveyors, discontinued during the war, has been resumed by the Fairfield Engineering Co. Its Model 608 is made only in a 30-foot length, however, with sideboards and cleats furnished in every case. For the present, the firm is standardizing its conveyors to attain maximum output. Capable of handling 100 yards of sand, gravel, or crushed stone an hour, the 608 is powered by either a 17-hp gasoline engine or a 5-hp electric motor.

The wheels for the 608 are 36 inches in diameter and 4 inches wide. They are mounted on swiveling spindles and come with or without tires. It is raised or lowered by a self-locking worm winch. The 4-ply, 28-ounce duck belt is 24 inches wide and rubber-covered on both sides. A receiving hopper is formed at the lower end of the conveyor by end and side plates.

Steel idlers of the 3-pulley type, 3¾ inches in diameter, are set on 36-inch centers; they have ball bearings and pressure lubrication. Extra rollers are placed at the hopper to withstand loading impacts. The 12-inch head pulley is mounted in a sliding take-up frame, while the 4-inch foot pulley has adjusting screws.

Complete specifications for this conveyor can be obtained by writing the manufacturer, the Fairfield Engineering Co., Marion, Ohio. Say you saw it in CONTRACTORS AND ENGINEERS MONTHLY.

Valve Device Saves Compressor and Hose

Safety and maintenance advantages are the purposes of the Numatic Safety Check made by the Hackett Mfg. Co. Used in compressed-air hose lines, this device shuts off air immediately in the event of an excessive flow through the line resulting from accidental disconnection or rupture.

The Numatic Safety Check comprises two parts, a housing and a steel ball. The housing attaches to the compressor and to the air line. The steel ball rests in a sump within the housing at the compressor end of the valve. This sump slopes upwards towards the discharge end which has a machined circular port smaller than the ball.

An excessive flow of air through the valve causes the ball to roll up the slope, seal the port, and shut off the air to the line. A bleed hole near the discharge port allows for equalization of pressure between the air line and tank when the line is again made airtight. The ball moves back from the port when pressure is nearly equal.

This check valve eliminates the practice of crimping a hose when changing tools, and it protects the compressor from damage that might result from the whipping-back action of the hose on a sudden break. It also enables bad leaks to be spotted and repaired, the firm says.

Built in standard ½ and ¾-inch sizes for working pressures up to 250 pounds, the Numatic is distributed through the E. D. Bullard Co., 275 Eighth St., San Francisco, Calif. Further details can be secured on mention of this item.

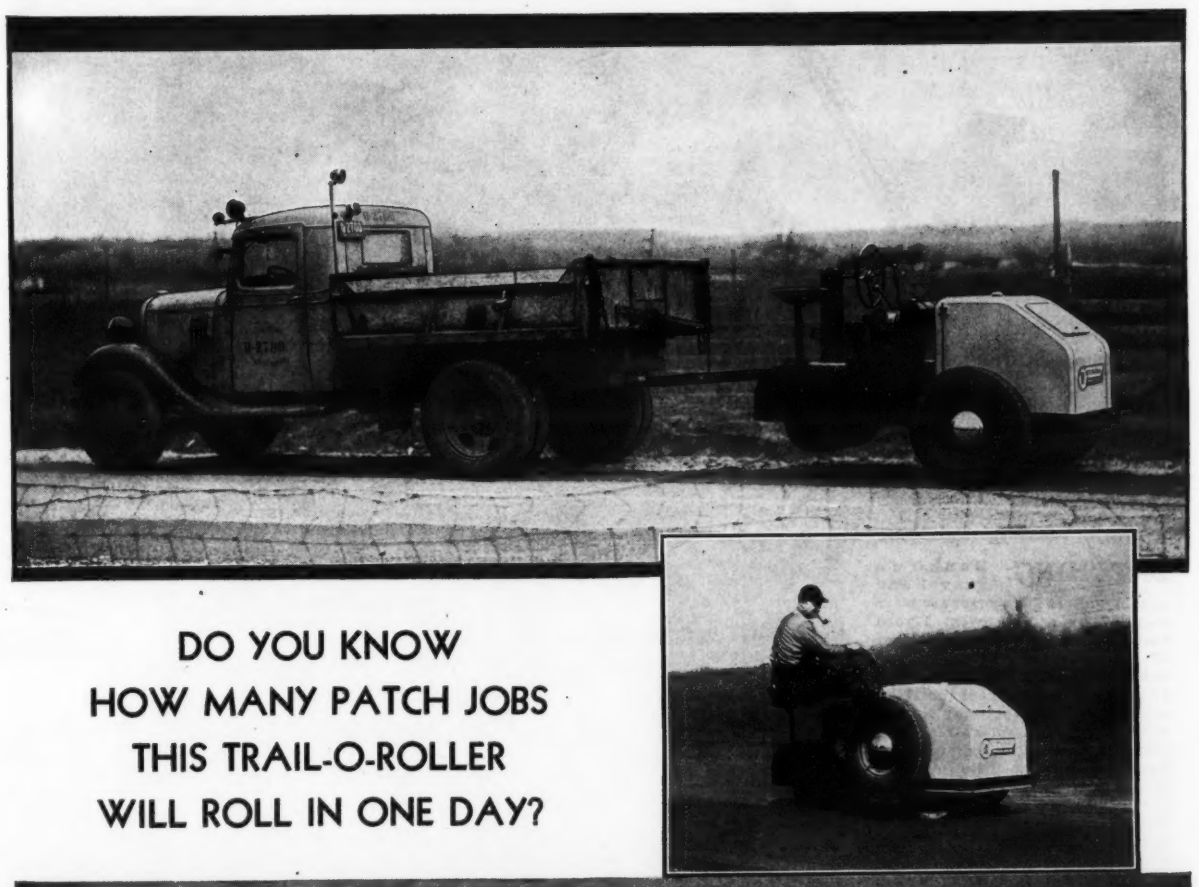
Crushing Unit Described

The various units that go to make up the Universal 546-P portable primary crushing unit are described in a new bulletin. It consists of a feed hopper, apron feeder, bar grizzly and by-pass, jaw crusher, under conveyor, and power unit. This crusher is mounted on a gooseneck chassis and fitted with pneumatic tires for between-job travel. In addition to a description of the 546-P, the bulletin contains information concerning its use in various types of set-ups for the production of aggregates.

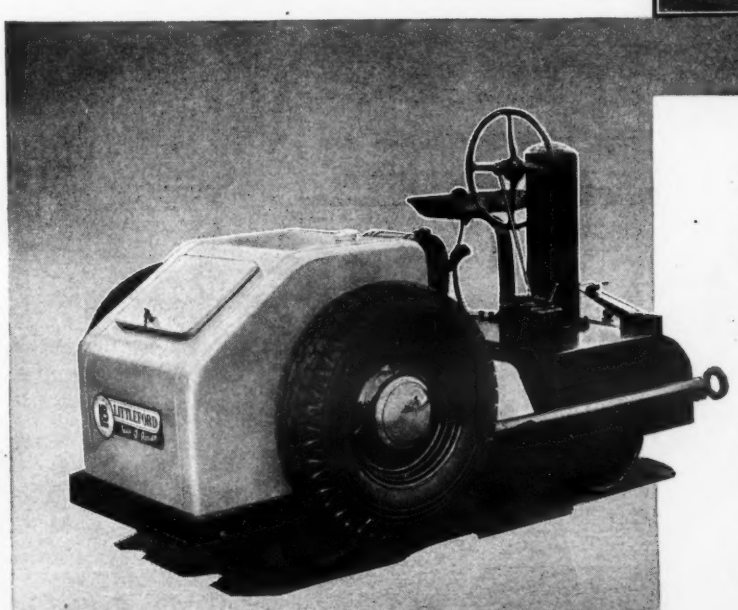
Copies of Bulletin 56 will be furnished by the Universal Engineering Corp., 620 C Avenue, West, Cedar Rapids, Iowa, on mention of this notice.

VICTOR
The range of a
VICTOR welding torch
is so great, even this picture fails
to do it justice... write for VICTOR folder Form 43.

VICTOR EQUIPMENT COMPANY, 844 FOLSOM STREET, SAN FRANCISCO 7, CALIF.



DO YOU KNOW
HOW MANY PATCH JOBS
THIS TRAIL-O-ROLLER
WILL ROLL IN ONE DAY?



Just as many as you trail it to—because the Littleford Trail-O-Roller will trail behind a truck as fast as the truck will go. And that isn't all—the Trail-O-Roller has a Patented Hydraulic Raising and Lowering Device that changes it from a Trailing to Rolling position or Rolling to Trailing position in 2 minutes' time. It's designed to roll those patches and to make them permanent.

The Trail-O-Roller gives as much compaction as a five-ton tandem, yet has the added features of being portable, easy to operate and above all, cuts the operating cost of rolling.

For Road, Street and Highway Rolling the Trail-O-Roller is the unit to do the modern job. For Better Roads use the Best Equipment — Littleford Black-Top Road Equipment.

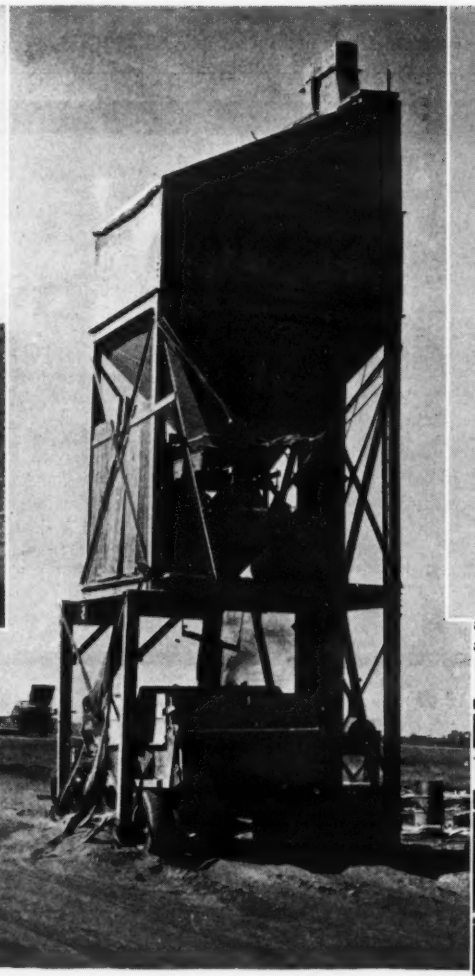
BLACK TOP ROAD MAINTENANCE EQUIPMENT LB SINCE 1900 LITTLEFORD

LITTLEFORD BROS., Inc.

485 E. PEARL ST., CINCINNATI 2, OHIO

FINE GRADE. A tractor-towed fine-grader removes excess material, as it rolls along forms set for runway paving at the Denton, Texas, Airport. The excess is being carried ahead of the forms and then bladed to one side by a motor grader.

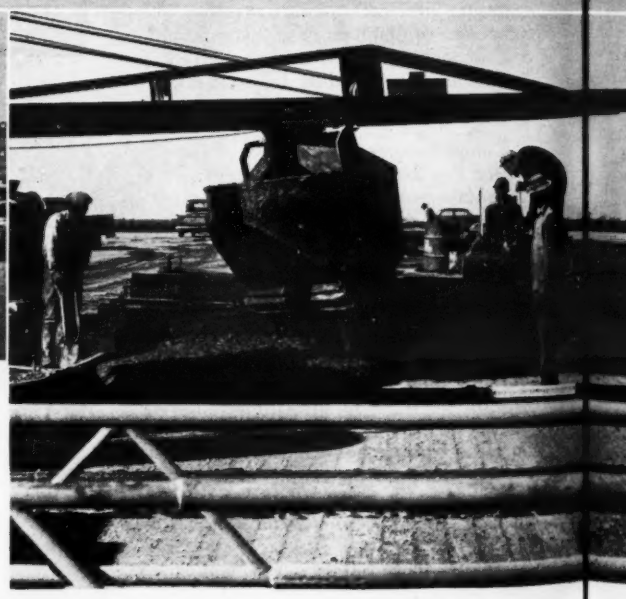
DELIVERY of joint material is being made by truck as laborers hand-tamp around the base of the Blaw-Knox steel forms. About 5,000 feet of forms were available on the job, with at least 1,000 feet set ahead of the paver.



Step-by-Step Of Concrete

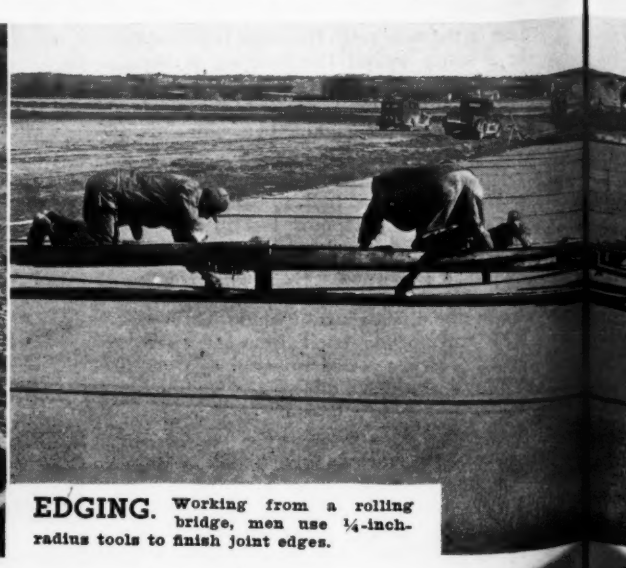
New Municipal Airport Has 4,150-Foot-Long Co... Farrell Contracting Co... Did the Jo...

(C. & E. M. Photos)



BATCHING. Bank-run gravel and crushed stone for aggregate were handled by a Northwest 1-yard clamshell. Above, one of the fleet of five Ford and Dodge trucks backs under the Blaw-Knox bins to receive its load from the Heltzel batcher. The next stop for the truck is the Heltzel bulk-cement plant, at the right, where Lone Star cement was weighed on Kron beam scales. The haul from the railroad siding to the batching plant was 5½ miles, and from plant to paver, an average of 1,500 feet.

FINISHING. A Jaeger-Lakewood finisher has done its work. And two aluminum bullfloats have been worked across the slab, giving it a herringbone finish. A rubber hose is now dragged parallel to the long dimension of the slab to modify somewhat the herringbone pattern.



EDGING. Working from a rolling bridge, men use ¼-inch-radius tools to finish joint edges.

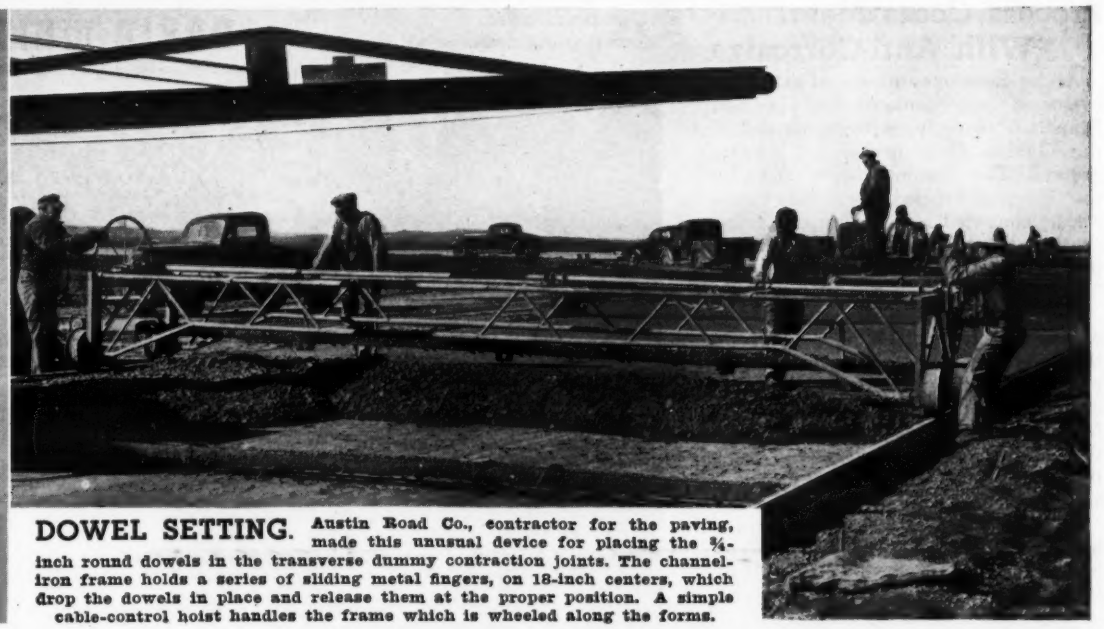
made by tra... the base ... forms were ... ead of the ...

JOINTS. Expansion joints, placed on 50-foot centers, consist of ¾-inch redwood lumber supported on Star Lugs every 22 inches. Here a joint, held by the Lugs and a capping device in the center, is in place. Dowels have been distributed ahead of the pour while the parade of paving equipment is seen in the background.

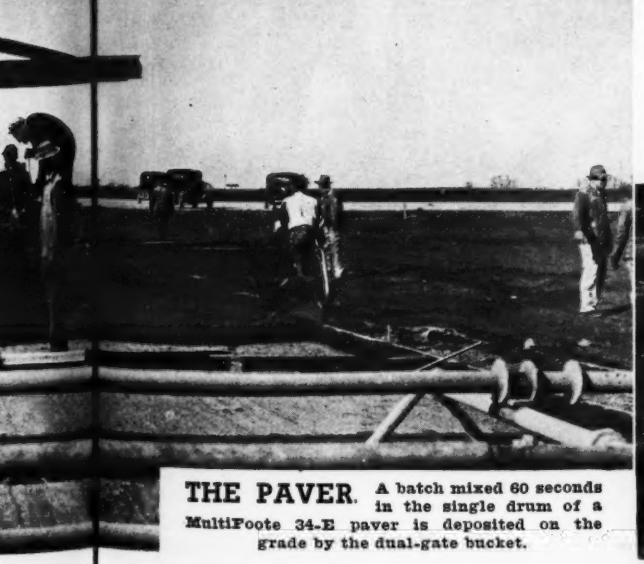
...Step Story ...ncrete Paving

...l Airport at Denton, Texas, ...t-Long Concrete Runway; ...ng Co. and Austin Road Co. ...the Job for CAA

(See article on page 1)



DOWEL SETTING. Austin Road Co., contractor for the paving, made this unusual device for placing the ¾-inch round dowels in the transverse dummy contraction joints. The channel-iron frame holds a series of sliding metal fingers, on 18-inch centers, which drop the dowels in place and release them at the proper position. A simple cable-control hoist handles the frame which is wheeled along the forms.



THE PAVER. A batch mixed 60 seconds in the single drum of a MultiFoote 34-E paver is deposited on the grade by the dual-gate bucket.

VIBRATING. Two Jackson vibrators were carried along on the paver to consolidate the concrete. An average of 275 batches were placed per day; the record was 417 in 8½ hours.

TESTING. Forms are removed from test beams of concrete 18 inches long x 6 inches square. Such beams were made up from each pour, cured for 7 days, and tested on a Raines Series 415 beam breaker, set up in a laboratory shack on the job.

THE JOB. A view from the finished end of the job shows the line-up of finishing and paving equipment, in reverse order. This contract for runway and two taxiways at the Denton, Texas, Airport was awarded by the CAA.

A Glaspray operator zinc-coats steel members of the Golden Gate Bridge in San Francisco.

Process Coats Metal With Anti-Corrosive

A war-developed means of attacking corrosion was demonstrated in San Francisco recently, with a portion of the Golden Gate bridge as proving ground. The demonstration, made by the Glaspray Process Co. of San Francisco, consisted of applying a zinc coating to the metal surface of the bridge by means of a specially designed "gun".

Glaspray workmen first grit-blasted every particle of paint and rust from the steel members of the bridge, exposing the clean surface of the dull gray metal. Using the zinc in powdered form, mixed with gas and forced through a flame of 786 degrees F, they then coated the steel with a layer of zinc in excess of 10/1,000 inch thick.

The flame of the gun is said to preheat the steel base so that the zinc coating fuses with the steel and becomes, for all practical purposes, a basic part of the structural member. Tests are reported to indicate that the coating will maintain effective protection for more than 12 years against salt-water corrosion. The weight of the zinc coating is less than that of the five coats of lead and oil paint heretofore used to cover the bridge.

The Glaspray process coats with lead, tin, aluminum, brass, bronze, copper, manganese, monel metal, silicon, nickel, iron, and chromium, as well as with zinc. It can also be used with glass and plastics. The process, which is relatively new, was used by the Navy during the war. Air compressors and the special guns are the principal items of equipment. Operators are protected by masks, and breathe through air hose to keep out grit particles.

Trucks Broken In En Route to Buyer

Under a new program adopted by the Four Wheel Drive Auto Co., all FWD trucks are to be broken in while en route to their buyers. Worked out in cooperation with Arco Carriers, Inc., the drive-away firm which delivers the trucks, the program is said to extend FWD manufacturing processes to the first 500 miles of travel.

Before each delivery the drivers are briefed on the speed to be kept for the first 100 miles, the next 400, and any additional mileage between FWD's headquarters at Clintonville, Wis., and the new owner. Standards for lubrication, greasing, and speed have been established by FWD after comprehensive tests into all factors of truck operation.

An instrument called the Tachograph is installed in each truck to give the minute-by-minute record of speed traveled. The driver makes regular checks on oil and water. Universal joints are greased daily, and complete oil change and lubrication are required every 500 miles en route. Engine oil specified by FWD is furnished for the oil changes. The daily reports of the delivery driver, the Tachograph disks, and the final report on the truck, are kept on file by FWD and can be inspected by the new owner.

During 1945, a total of 200,361 miles was traveled by FWD trucks on delivery. Arco's longest delivery this year was from Clintonville, Wis., to Mexico City, 1,576 miles. The longest overland FWD truck delivery on record is 5,200 miles, from Clintonville to Fairbanks, Alaska.

Free Vest-Pocket Booklet Contains Valuable Data

Engineers and contractors will find useful a little vest-pocket-size booklet "Facts and Figures" published by Pioneer Engineering Works, Inc. The eighth edition of the 50-page pamphlet has just been issued.

Mathematical tables of all sorts condense a wide range of miscellaneous information in the booklet. Special emphasis is placed on figures and facts relating to the use of aggregates, crushers, and conveyors. A handy set of geological definitions is appended.

To obtain a copy of this booklet drop a postcard to the Pioneer Engineering Works, 1515 Central Ave., Minneapolis 13, Minn. Tell the firm you read this notice.

Represents Lima in West

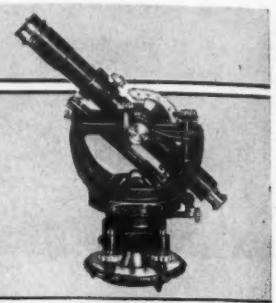
The Foulger Equipment Co. of Salt Lake City has been appointed sales agent in Utah and southwestern Wyoming for the shovels, cranes, and draglines made by the Lima Locomotive Works at its Shovel and Crane Division plant, Lima, Ohio. Bert Foulger, who was with the Utah Construction Co. for 27 years, heads the distributor firm.

Order Now! MAKE SURE OF EARLY DELIVERY

UNIVERSAL LEVEL-TRANSIT

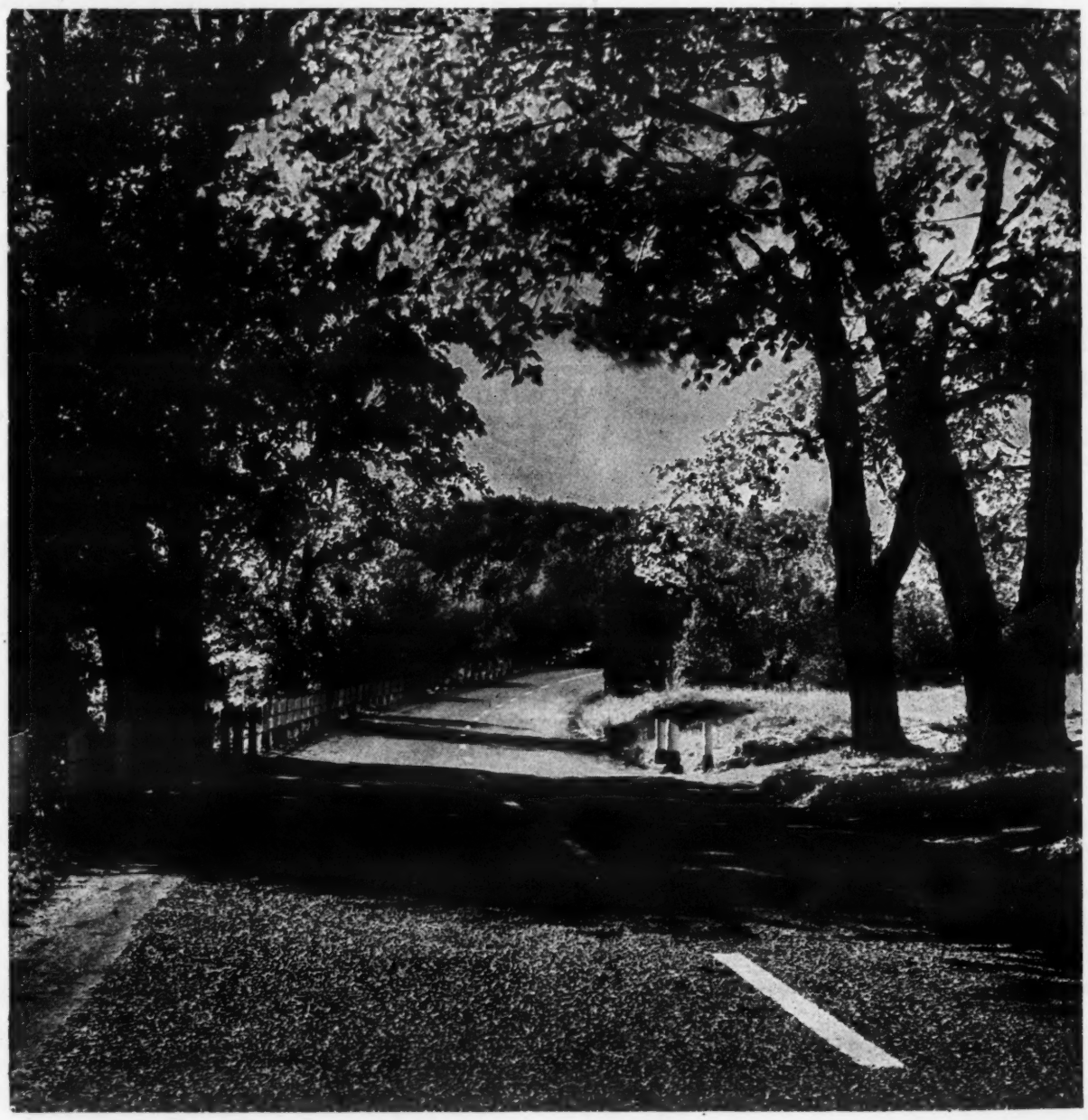
Latest, improved model. Telescope 12" long, 25 power — Horizontal Circle 4½" with vernier to 5 minutes — Vertical Arc 3".

Instant change-over from Level to Transit. Most practical all-around builders' instrument ever designed. Write for full details.



DAVID WHITE CO. 305 WEST COURT ST. MILWAUKEE 12, WIS.

Manufacturers of Instruments for Engineers, Surveyors and Builders.



Invitation to go places...

It's the kind of road that motorists like to travel on a Sunday afternoon. It's quiet . . . and pretty . . . and agreeably free of traffic.

Yet half of America lives on roads like this . . . and *all* of America depends upon them for life and livelihood. Food from farm to city, manufactured goods from city to farm . . . all pass over America's 2,400,000 miles of secondary roads.

Unfortunately, not all of this vital farm-to-market network is as well paved as the road above. More than half is still unsurfaced, and over one-third is still classed as "primitive."

In the work that remains to be done, Barrett Tarvia* road tar will have an increasingly important part. The combination of Tarvia, local materials and local labor enables almost any community to build modern all-weather roads quickly and at low cost.

Why not discuss your own secondary road problems with the Tarvia field man?

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Barrett Tarvia*

*Reg. U. S. Pat. Off.

Plant-Mix Surfacing Covers Concrete Base

One Lane of Dual Highway Patched and Widened in Preparation for Surfacing Of U. S. 40 in Delaware

✦ THE improvement of a 7.4-mile stretch of U. S. 40 in Delaware, from the Maryland state line to Bear Station, was continued this spring and summer. A two-course bituminous-concrete pavement was laid on top of the concrete road which had been patched and widened last autumn. This highly traveled dual highway connects Wilmington, Del., and Baltimore, Md. In this section of it, a grass parkway averaging 50 feet in width separates the opposing traffic lanes, which were built at different times. Although at this point the road runs nearly east and west, the lanes of traffic are generally called north and southbound since the two large metropolitan terminals are usually considered north or south of each other. The more recently constructed northbound lane needed no repairs. But the southbound lane, about 30 years old, had several locations where its 8-6-8-inch concrete paving required replacement.

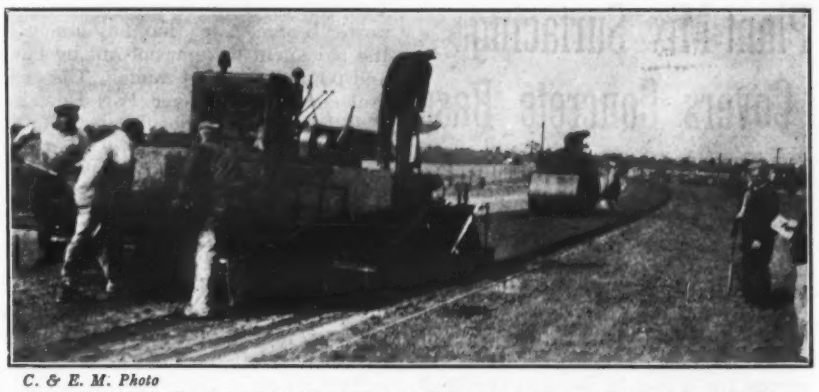
The $236,576.10 contract which the Delaware State Highway Department awarded to George & Lynch of Wilmington, Del., included work on the southbound lane only. When this lane was originally built, car traffic was light, and its 16-foot width was normal for the times. In 1930 the road was widened to 20 feet with a 4-foot strip of concrete. A similar strip was added in this contract, making a total width of 24 feet. This construction differed for the southerly 2 miles where previous work had widened the road to 23 feet. Some patching was done to this section but the width was left as it is. Five years ago a 2-inch course of Amiesite was laid over this portion of the road. So the present contract called for only 3 inches, compacted measurement, of plant-mix instead of the 4 inches which was spread over the rest of the job. At both locations the bituminous concrete was put down in two courses, binder and surface.

Patching and Widening

Patching and widening were started last autumn on October 15, and concreting operations were finished two months later. During all the phases of construction both directions of traffic used the northbound lane. In Delaware Highway Department parlance, any concrete replacement that is 30 feet or less in length is called a patch; it is paid for on a square-yard basis. Any replacement over 30 feet long, including the concrete widening strip, is classified as cement-concrete base course; it is paid for by the cubic yard. All paving was poured 8 inches thick, and varied in size from a patch 4 x 6 feet to a section of base course 158 x 20 feet.

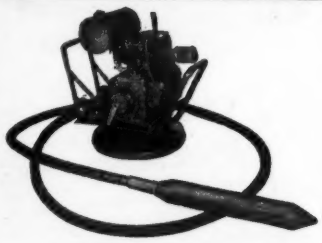
Cracked or disintegrated concrete was removed by (1) drilling holes around the keeled outline of the area, and then (2) completing the cleavage with the adjoining pavement by means of spade-edge breaking hammers. Pneumatic hammers powered by air compressors were used in this work. The concrete within this area was then broken up by a single-ton steel ball swung by a truck crane. A Northwest ¾-yard shovel picked up the rubble. It also excavated to a depth of 8 inches below the bottom of the concrete wherever the subgrade was considered unsuitable as a foundation for the new concrete. The excavated material was hauled away and used either to widen

(*Continued on next page*)



C. & E. M. Photo

Plant-mix surfacing for a 7.4-mile stretch of U.S. 40 in Delaware was laid by a Barber-Greene bituminous finisher and rolled by two Buffalo-Springfields, one of which is seen in the background.



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FRONT END SHOVELS for Industrial Tractors
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America's Most Complete Line of Material Handling Buckets

All purpose-
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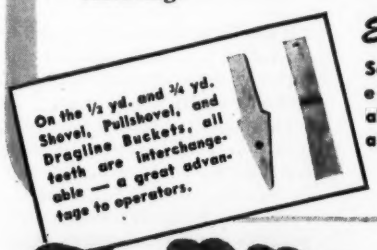
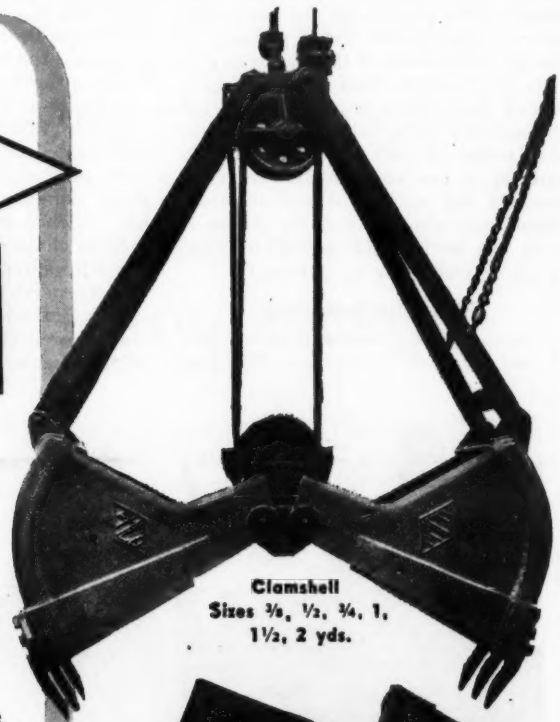
- DRAGLINE
- CLAMSHELL

• FRONTS, BOTTOMS, SCOOPS and TEETH are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.



On the ½ yd. and ¾ yd. Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable — a great advantage to operators.

Experience Counts
See your shovel man or equipment dealer about PMCO Buckets and Dippers.



Clamshell
Sizes ⅜, ½, ¾, 1, 1½, 2 yds.

Pullshovel
Sizes ⅜, ½ and ¾ yd.

Dragline
Sizes ⅜, ½, ¾, 1, 1½, 2, 2½ yds.

Shovel
Sizes ⅜ to 18 yds.

"Quality Since 1880"
PETTIBONE MULLIKEN CORP. CHICAGO 51, U. S. A.
WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.

Plant-Mix Surfacing Covers Concrete Base

(*Continued from preceding page*)

fills, or wasted in some adjacent low-lying areas.

From a gravel pit located about a mile off the road at the center of the job, a Bucyrus-Erie ¾-yard shovel dug selected borrow. A Caterpillar D6 tractor-dozer piled up the material for easier loading into trucks. Laborers spread the gravel by hand in the small holes. In the larger areas, a Caterpillar No. 12 power grader bladed the borrow to the average 8-inch depth, and a roller compacted the backfill as it was spread. The selected borrow fell within the following gradation requirements:

Sieve Size	Per Cent Passing
1-inch	95-100
¾-inch	90-100
No. 4	85-100
No. 10	80-100

The power grader also dug the widening trench which was backfilled with gravel. For concreting, the contractor set up a batch plant about midway on the job at a siding of the Pennsylvania railroad, Fort Du Pont branch. Trucks hauled the batches to a Koehring 27-E single-drum paver which was supplied with water by tank trucks. An admixture of 2 per cent calcium chloride speeded the curing of the concrete, which was also covered for 24 hours with wet burlap and opened for construction traffic one week later.

Plant-Mix Surfacing

The spreading of bituminous concrete started on April 22 this year. The road was first carefully cleaned by a rotary power broom. After that, any cracks in the pavement were swept out by hand and poured with hot asphalt. The general contractor engaged Earl Downing of Wilmington to shoot the tack coat of RC-2 asphalt at the rate of 0.075 gallon to the square yard. This was applied two days before the paving started. It was done a section at a time, just in advance of the base course. The bituminous distributor first shot a 12-foot strip; then the spray bar was widened to 13 feet to make sure, by means of the overlap, that the center line of the pavement was not skimped.

Over all the job except the southerly 2 miles mentioned before, the base or binder course was spread to a compacted depth of 2½ inches and the top or wearing course to a 1½-inch compacted depth. When compacted, the total thickness of pavement came to 4 inches, each of the loose depths being placed approximately ¼-inch heavy. The base course was spread first over the entire project by a Barber-Greene bituminous finisher with its box set for 12-foot lanes. At the end of a day's run over half the pavement width, the machine was brought back to the starting point and the remaining half width was done on the next day. The same system was used on the top course. The finisher operator kept a good alignment by watching a string line set a foot off the edge of the pavement, and also by a chain dangling to the ground from a bar attached to the machine. By keeping the chain on the edge of the pavement he spread the hot-mix where it was intended.

Two Buffalo-Springfield tandem rollers followed closely in back of the finisher; one was an 8 to 10-ton unit, while the other was a 10 to 12-ton. By loading the smaller roller with water and leaving the larger one empty, their effective weights were kept at 10 tons. A 500-gallon tank on a Studebaker flat-bed truck supplied water for the finisher and rollers. The water was pumped from near-by creeks by a Jaeger 4-inch pump mounted on the rear of the truck.

C. & E. M. Photo

Excess material on the new shoulder was picked up by an Athey Force-Feed Loader at a rate of 3 to 5 yards a minute and removed by dump trucks.

Supplying the Mix

The bituminous concrete was pur-

(*Concluded on next page*)

GATKE
Custom-Bilt
BRAKE BLOCKS and LINERS

Whether it's heavy or light equipment —trucks or tractors and trailers—long hauls or short—hills or heavy traffic —whatever the service, the smooth, non-grabbing action and extra wear life of GATKE *CUSTOM-BILT* Brake Blocks add miles to tire life and help keep equipment fit for the road with minimum maintenance.

RESULTS TALK. Just use GATKE *CUSTOM-BILT* Brake Blocks for your next five relines and compare.

Ask your GATKE Jobber or write.

Gatke CUSTOM-BILT BRAKE LININGS
BLOCKS SETS ROLLS SHEETS
GATKE CORPORATION
228 N. La Salle St., Chicago 1, Ill

Plenty of light *on the job,* with Onan Electric Plants

All the illumination you need for night operation . . . inside shovel cabs, spot-lighting dangerous obstacles, or flood-lighting entire work areas.

Onan plants have many advantages as a source of power for lighting *on the job.* Can be truck mounted, installed in or on construction machinery, or even carried by hand depending on size. Capacities range from 350 to 35,000 watts. Onan gasoline engine powered, they are easy to start. Built as a compact single unit with Onan generators direct-connected for permanent alignment.

Lighting is only one of many uses for Onan-generated electricity. Used extensively in the field for powering electrical tools, pumps and other motor-driven equipment.

D. W. ONAN & SONS
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PRIME MOVER: ONAN 4-cycle, one and two cylinder gasoline engines. Air or water-cooled. Four and six cylinder heavy-duty industrial engines on larger models.
GENERATOR: ONAN. Direct-connected to engine. Inherently regulated. Self-excited. Heavy-duty construction. Drip-proof.
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CAPACITY RANGE: 350 to 35,000 watts.
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WRITE FOR FOLDER

POWER & LIGHT FOR EVERY NEED
Onan
ELECTRIC PLANTS

Plant-Mix Surfacing Covers Concrete Base

(Continued from preceding page)

chased from the General Crushed Stone Co., which had set up a plant for commercial business at Mt. Pleasant on a siding of the Pennsylvania railroad about 10 miles from the center of this contract. Stone for the mix was shipped by rail from the company's quarry at Glen Mills, Pa., 40 miles distant. Asphalt was supplied by the Atlantic Refining Co. of Marcus Hook, Pa., about 25 miles away. A Hetherington & Berner asphalt plant, with a 70 to 80-ton capacity per hour, mixed the bituminous concrete. It turned out an average of 500 tons in a 10-hour day, with a maximum of 750 tons on the best day.

Nine trucks were hired by the ton-haul. They transported the mix to the job under tarpaulins in order to hold the temperature as closely as possible to 270 degrees F, the temperature at which it left the pugmill. One International truck hauled 10 tons, while each of the other eight—Fords, Dodges, and International—carried 8 tons. At the finishing machine a small but well organized crew spread the hot-mix in an efficient manner. The paving gang consisted of a foreman, a Barber-Greene operator, four laborers, and the two roller operators. Two of the laborers saw that the mix was properly discharged and fed from the trucks to the hopper on the finisher. Another gave special attention to the center-line joint by throwing on extra material when necessary. And the fourth gave the surface a final finishing check with a 10-foot straight-edge.

The 2-ton plant-mix batches met the following gradation requirements:

Sieve Size	Per Cent Passing Base	Surface
1½-inch	100	.....
1-inch	95-100	.....
½-inch	95-100	100
⅜-inch	.....	80-100
No. 4	25-45	50-65
No. 10	.....	30-45
No. 20	.....	20-30
No. 40	.....	15-25
No. 80	.....	10-25
No. 200	5-10	5-10
Bitumen	4½-7	6-8

Shoulders

Consistent with the widening, four box culverts of reinforced concrete were lengthened 10 feet, a new 10-foot shoulder was added on the outside of the new pavement, and a 6-foot shoulder built on the inner or parkway side. For this latter shoulder, topsoil from the borrow pit provided the necessary material. It was tapered from a 4-inch thickness adjacent to the pavement down to 0 at the edge. Before building the outside shoulder, a Caterpillar No. 12 power grader first shaped the backslope. It opened the ditch line and made a windrow of the excess material along the shoulder. From there an Athey Force-Feed Loader transferred it to dump trucks at the rate of from 3 to 5 yards per minute.

The outer shoulder was then built up with a 4-inch layer of gravel taken from the borrow pit, spread with the grader, and compacted with a rubber-tire roller. Sodding of backslopes was included in this contract. And if it fails to germinate and vegetate itself spontaneously, the shoulder on the parkway side will be seeded in some future operation to conform to the appearance of the rest of the highway.

Quantities and Personnel

The major items included in this contract for patching, widening, and plant-mix surfacing were:

Excavation	11,200 cu. yds.
Removing concrete pavement	2,560 sq. yds.
Selected borrow	8,600 cu. yds.
Concrete patching	1,700 sq. yds.
Concrete base course	3,180 cu. yds.
Topsoil	22,300 sq. yds.
Bituminous concrete	22,000 tons
Sodding	5,300 sq. yds.

The job was scheduled for completion in the early part of June, but delays in obtaining materials because of the nation-wide transportation tie-ups set the schedule back somewhat.

V. Lewis Blake was Engineering Inspector on the project for the Delaware State Highway Department, which is headed by W. W. Mack, Chief Engineer, with W. A. McWilliams as Assistant Chief Engineer in charge of construction. C. C. Reynolds is Division Engineer for the area in which this contract was located, and T. Paul Dabson is Division Construction Engineer. For the contractor George & Lynch, Joseph Pennington is General Superintendent, while M. Hayes Wilson, Jr. was Project Superintendent.

A 6-Yard Dumping Unit

The Koehring Dumptor, built in either gasoline or diesel-powered models, is described in a 16-page illustrated catalog issued by the Koehring Co., 3026 W. Concordia Ave., Milwaukee 10, Wis. Catalog K-150 can be obtained from the firm on mention of this notice.

WHAT YOU NEED IN A DRAGLINE BUCKET

DURABILITY—All-welded construction. Stellited lip. Amsco manganese fittings and tooth bases with removable tooth points.

LIGHTNESS — Unnecessary weight cut to limit without sacrificing strength. More pay dirt; less deadweight.

EASE IN HANDLING—Free swing and balance. Wide, strong arch for easy digging and dumping. More cycles with bigger loads.

QUICK, CLEAN DUMPING—No suction to hold back discharge. Faster work with less wear on operator and equipment.

MULTI-PURPOSE USE—Handles any material. Sizes ⅜ to 24 yards. Fittings adapted for quick change-over.

IT ADDS UP TO A YAUN BUCKET!

Yaun's patented Basket-Type bucket, shown here, eliminates water from load, assures quick-drying fill. Handles any material except "soup." It is a duplicate of Yaun's Shell-Type bucket, except that the rear is made of heavy flat bars, instead of sheet steel.

For full, FREE information—prices, parts, specifications and records of performance—write your dealer or Yaun Dragline Buckets & Mfg. Plant, Baton Rouge, La.

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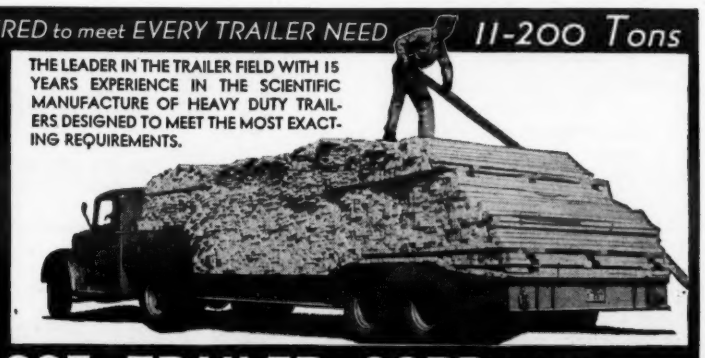


LA CROSSE TRAILER CORP. LA CROSSE, WISCONSIN

Lumber Shortage A Bridge Problem

Last Covered Bridge on Pacific Highway Finally Replaced With 300-Foot Concrete Span

✦ IN its design stage, construction of the Graves Creek Bridge on U. S. Highway 99 in Oregon didn't seem likely to pose a single problem. The bridge is straight. The road on both approaches is straight. The bridge deck is level. There could be absolutely no traffic problem, for the bridge was to be built on one end of the job in advance of the highway. And if it hadn't been for a lumber shortage and a rainy season, there might actually have been no problem.

The new bridge is 300 feet long and 29 feet 9 inches wide from curb to curb, with a 4½-foot sidewalk on each side of its deck. It will carry two lanes of the new highway now under construction by McNutt Brothers of Eugene, Oreg. When it is opened to traffic, it will replace the only covered bridge left on Highway 99.

It was built under a subcontract with O. E. Joelson, also of Eugene. Joelson moved his construction forces to the job late in 1945, in the face of a serious lumber shortage and with the rainy season approaching.

Normally Graves Creek is a clear, fast-flowing mountain stream, with a discharge of something like 40 cubic feet per second. It winds down through beautiful mountainous country, and passes along a fairly level piece of ground where it intersects the new highway. Its bottom there is full of gravel and boulders.

Formwork

Joelson brought in some native pine and fir piles 18 feet long, and set or drove them to about 5 feet of penetration to hold the formwork. He spaced these piles six to a bent, with bents 6 feet center to center.

The 1945 season was drawing to a close when he finished this work. He had tried his best to obtain deliveries of lumber for the concrete forms. But strikes in the lumber industry made it impossible for him to get more than a few truckloads. Then Graves Creek went on a rampage and washed away part of his work. The underpinning and falsework piles stayed, however, and suffered no damage.

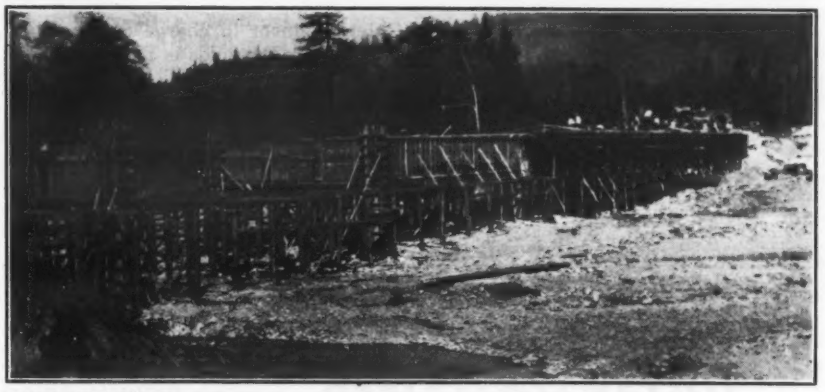
Early this year Joelson resumed work. He managed to get lumber, steel, cement, and aggregates. His men laid 6 x 6-inch caps on the pile bents, and scabbed 3 x 12-inch stringers together longitudinally with the structure.

All forms were made from 1 x 8-inch shiplap fir lumber, surfaced on both sides. The boards were cut with power saws at a table erected on the job, and nailed to 2 x 4-inch studs spaced 18 inches center to center. The supporting piers and bridge beams were formed with the bottom of the deck, but the deck pour was not made until piers and beams were in place.

Concreting

Concrete aggregates were hauled in, partly from a commercial plant at Grants Pass, Oreg., and partly from crushed rock available at McNutt Brothers' rock crusher about 1½ miles from the Graves Creek Bridge. This material was stockpiled on the road fill on one of the bridge approaches.

It was rehandled by a Cletrac tractor with an Ateco loader. For about $1 per cubic yard this machine loaded a Chevrolet dump truck, which hauled about 150 feet to a timber hopper with three bins. Gates on these bins were tapped by workmen with concrete buggies on two rubber tires, who hauled the sand and aggregate to the 3-sack Jaeger mixer.



C. & E. M. Photo

The Graves Creek Bridge is 300 feet long and 29 feet 9 inches wide from curb to curb. The falsework for the concrete forms is seen in the foreground.

Between the aggregate bins and mixer, Joelson put a Fairbanks scale on which batch weights were checked. Overage or underage was corrected by adding to or subtracting from the buggy. The 3-sack batch, mixed according to the specifications of the Oregon State Highway Department, was as follows:

Sand	640 lbs.
Washed rock, ¾ to 1¼-inch	590 lbs.
Crushed rock, 2 to 1½-inch	472 lbs.
Cement	288 lbs.
Water	15 gals.

Moisture tests were run on sand and fine rock, and weight corrections were made by the State Highway Department Inspector assigned to this work. Mixing water was pumped from Graves Creek by a Fairbanks-Morse 1½-inch electrically powered centrifugal pump. It was delivered under pressure to the Jaeger mixer by means of a hose and pipe line.

The 171,000 pounds of deformed steel bars for reinforcement was furnished by the Soulé Steel Co., and hauled from its mill directly to the job. The largest size of reinforcing steel was 1½-inch square bars.

Concrete buggies took concrete at an average slump of 2¼ inches on a 12-inch cone from the mixer. They trundled it over timber falsework to the pours. There it was dumped in the forms and consolidated by a Jackson vibrator. Output of this mixing set-up

(*Concluded on next page*)

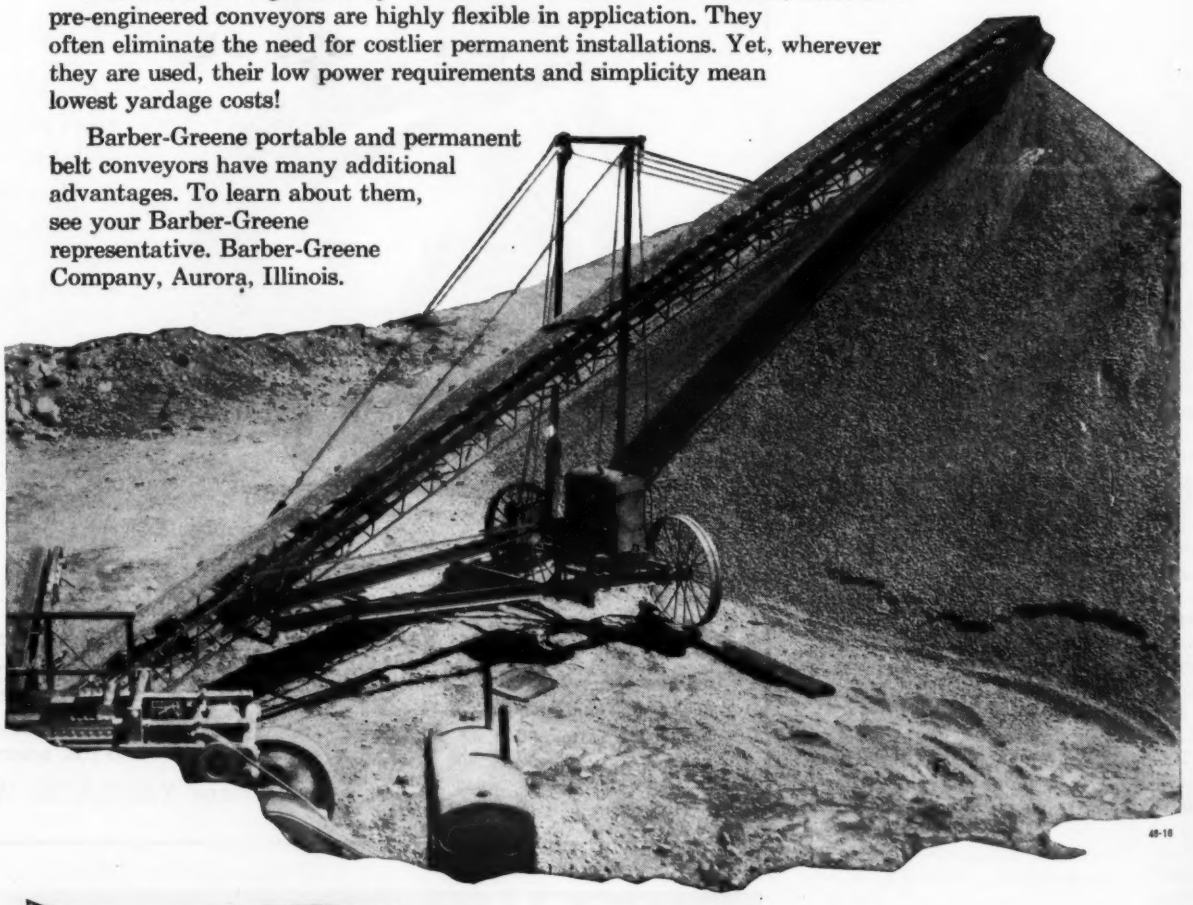
Why B-G Portable Conveyors do so much—for so little

• B-G portable belt conveyors keep materials on the move at a constant flow that means high daily capacity wherever they're put to work.

They can move all over the job, the quarry, the supply yard—stock piling and loading everything from sand to cement, crushed rock to coal.

Shortened or lengthened by the addition or removal of sections, these B-G pre-engineered conveyors are highly flexible in application. They often eliminate the need for costlier permanent installations. Yet, wherever they are used, their low power requirements and simplicity mean lowest yardage costs!

Barber-Greene portable and permanent belt conveyors have many additional advantages. To learn about them, see your Barber-Greene representative. Barber-Greene Company, Aurora, Illinois.



B-G Barber-Greene CONSTANT FLOW EQUIPMENT

LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

Bridge Problem

(Continued from preceding page)

was approximately 10 cubic yards per hour, and Joelson figured his 8-hour shift per day on that basis. Of course, a pour might extend longer in an emergency, particularly the finishing and curing work.

If it was in a pier or beam pour, the concrete was roughened after being vibrated, and the hook bars protruding into the deck slab were cleaned. Deck pours were handled somewhat differently at that stage, in order to finish them properly. They were struck to grade by two finishers handling a timber puddler. This instrument pounded all protruding rocks down in the concrete deck slab, and worked enough fines towards the top to permit a good finishing job. Concrete was worked with this instrument until it was level with the screeds.

Constant checking with a 10-foot aluminum straight-edge was done all during puddling and finishing of the deck slab. Since traffic will pass over this bridge at speeds up to 75 miles per hour, both Joelson and the Inspector were extremely careful about the finishing job. They allowed no tolerance on a 10-foot straight-edge. It may seem inconsistent to say that the finished slab, when rechecked the day the bridge was visited by the writer, was off about ⅛ inch in 10 feet. But this minute variation will almost always occur, no matter how theoretically perfect the checking.

Concrete slabs were finished by brooming at right angles to the center line of the bridge. This was done just as the concrete took its initial set, but not too late. Slabs were cured by flooding them with water. Curing water, and sprinkling water for forms in advance of pours, was furnished by a Hercules-powered Gorman-Rupp 4-inch centrifugal pump.

All told, Joelson handled 675 cubic yards of concrete in the Graves Creek Bridge at a subcontract price of $32 per cubic yard. Contract price was $44 per cubic yard for bridge concrete, and 6½ cents per pound for steel reinforcing. The concrete was designed for a compressive strength of 3,300 pounds at 28 days, and test cylinders were regularly made.

Since most of the form lumber and timbers were new, Joelson planned salvaging some of the material for possible future use after the Graves Creek Bridge was finished. Completion deadline was July 21, 1946.

Personnel

Joelson himself superintended his subcontract. The shortage of materials and the uncertainty of equipment and labor made it a difficult contract although, under ordinary conditions, it would have been ideal, he says.

H. M. Teel was the Bridge Inspector for the State, and G. E. Roberts was the Resident Engineer. R. H. Baldock is State Highway Engineer of the Oregon State Highway Department, and H. G. Smith is State Construction Engineer.

C. & E. M. Photo
This close-up of concrete pouring at the Graves Creek Bridge shows the method of strike-off and the 10-foot straight-edge, in the foreground, to check the finishing.

New York Begins Work On Two Thruway Sections

Governor Thomas E. Dewey was on hand to give his official blessing as construction of the New York State Thruway project began July 11. The ceremonies were held at Liverpool.

Contracts for the first two sections of the state-traversing route were let June 26, Charles H. Sells, State Superintendent of Public Works, has revealed. The D. W. Winkelman Co. and A. S. Wikstrom of Syracuse hold a contract valued at $593,732.95 for preliminary grading and structures on 3.46 miles of the Ontario Thruway section of the project in Onondaga County. The second Thruway contract, valued at $429,609, has been awarded to the Grandview Co. of Mount Vernon for similar work on 2.81 miles of the Catskill section in Greene County.

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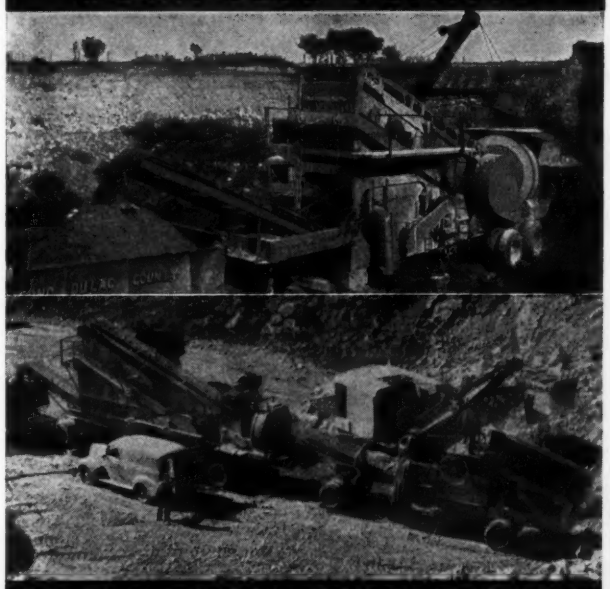
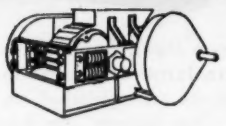
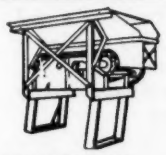


AUXILIARY EQUIPMENT

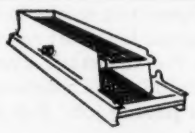
JAW CRUSHER



ROLL CRUSHER



APRON FEEDER



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Shown at left are two Universal portable plants that have made outstanding records all over the country. The 880 Gravelmaster, a single unit, dual crusher plant that combines easy portability with high production and has the in-built stamina that keeps maintenance costs down. The 822-Q, a dual unit rock plant, designed for low cost quantity production of aggregate. Superior Universal engineering and precision gives you these plants ready to go to work without the need for changes on the job. They're only two of the dozens of field-proved Universal rock and gravel plants.

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ROCK AND GRAVEL CRUSHING AND SCREENING PLANTS

Want to Save Money? Take Care of Tires

Way back in the fourth or fifth grade, we all probably had drummed into us that little piece that says, "For want of a nail the battle was lost!" Well, contracting has long left the days of the horse, but attention to detail can still determine the outcome in the battle of production.

"How?" you ask. The Rubber Manufacturers' Association gives you an answer in a valuable booklet it has just issued. You may be wasting money every time one of your trucks rolls, and you may not realize it—all for want of a little precaution and common sense.

"Me!", you deny vigorously. Yes, maybe *you*. You wouldn't send a boy to do a man's job, yet every day you may be putting on the road trucks which have improper tires for their job, are in poor mechanical shape, improperly loaded, or have a driver with poor operating habits. And it wastes your money.

The damage that tire negligence can do is emphasized by RMA in a picture-magazine type of presentation. Photographs and diagrams illustrate just what happens to your tires in every-day use. Text tells how you can forestall much needless and expensive wear.

Every contractor and highway official should have a copy of this free booklet in a spot where his entire truck staff—drivers, mechanics, and purchasing agents—can study it. Drop a card to the Editorial Department of CONTRACTORS AND ENGINEERS MONTHLY, and we'll be glad to send you one.

Crane and Carrier Run From Crane Cab

A remote control which allows one man to operate both the crane and its carrier from the crane seat has been announced by the Harnischfeger Corp. This gives on-the-job mobility to the truck-crane unit.

A control panel located in the crane's cab permits the crane operator to start the carrier engine, operate the clutch, shift gears, steer, blow the horn, and apply the brakes. Compressed air, controlled by electricity, makes this possible. A center pin connects the panel with solenoid air valves which control outlet of the air needed to operate the various carrier movements.

To use this remote control, the dash switch in the carrier cab must be pulled on, and the auxiliary transmission shifted into low. This connects the remote-control circuit with the carrier battery, and sets the air brakes. The control board in the crane cab is largely a push-button affair. The carrier's rear-wheel brakes may be operated by the treadle valve in the carrier cab, or through the solenoid valve.

Further details about the installation of this remote control for P&H truck-crane carriers can be obtained on mention of this story. Write the Excavator Division of the Harnischfeger Corp., 4419 W. National Ave., Milwaukee 14, Wis.

Portable Crushing Plant

The portable Junior Tandem Straight-line crushing and screening plant can handle 75 to 100 tons of 1-inch aggregate material hourly, the Iowa Mfg. Co. says. This Cedarapids unit is described by text, diagrams, and illustrations, in a bulletin issued by the firm. Write Iowa and ask for Bulletin JT-2. The address is Cedar Rapids, Iowa.

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No other big paver offers the ease of maintenance and operation that results from the simplicity of the MultiFoote Duomix—the *new* double drum paver!

Lift the covers under the deck. Here is the main operating machinery with the power take-off. Only one main drive shaft. Few gears. Simple—easy to get at!

The power take-off consists of helical cut gears running in oil in an oil tight case. The drum drive shaft is special chrome molybdenum steel. Gears are wide faced and clutches are large and cool running. All high speed shafts are mounted on Timken bearings.

The power discharge, bucket drive and boom hoist mechanisms are in an easily accessible housing over the boom pivot.

Operating controls are easy to handle and grouped for short reach. Use of only one lever sets the automatic cycle in operation.

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Winter's Mud Fails To Halt Levee Work

500,000 Yards of Earth Moved With Draglines and Tractor-Scraper Units; Pile Dike Now Under Way

✦ WORK on 12,246 linear feet of new loop levee in the Plum Bayou district of central Arkansas is now substantially completed. However, rain and muddy working conditions slowed construction operations considerably. The job was pushed as fast as possible by the Clark & Sager Construction Co. of Memphis, Tenn., in a retreat from the Arkansas River, which was eating into the existing levee along the river bank.

The Plum Bayou district is near England, Ark., about 30 miles south and east of Little Rock. It is the site of a Federal farm subdivision. A huge tract was purchased by the Federal government in the 1930's, and 40-acre tracts with homes were sold to tenants on a 40-year underwriting contract. The land is wholly agricultural. It was protected from Arkansas River floodwaters by a levee system interposed between the river and adjacent lowlands. As further protection, a loop levee was built back of the existing structures in 1939, but the Arkansas River began cutting this away below Brodie Bend. The new loop levee will be augmented by a pile dike. The contract for it was awarded to the W. P. McGeorge Construction Co. of Pine Bluff, Ark.

Destructive floods occurred at England in June, 1877, when a stage of 230.7 feet was reached. In May, 1943, this mark was bettered by a flood stage of 231.6. However, an earlier disastrous flood of April, 1927, set the record elevation—234.2 feet referred to Gulf of Mexico levels. So the new loop levee recently built for the Little Rock District of the U. S. Engineer Department has a crown elevation 5 feet higher than the 1927 flood stage.

The new levee varies from 11 to 16 feet in height with a crown width of 8 feet. It has side slopes of 3 to 1 on the river side, and 4 to 1 slopes on the back or land side. On the river side there is a 30-foot berm at the bottom toe of the slope. After this the borrow-pit excavation began on a 2 to 1 slope for 4 feet, and then continued on a slope of 25 to 1 for about 200 feet, more or less depending on the height of levee and the amount of material needed. Borrow material was mostly sand and silt, but near the lower end of the job some black clay was found. Both side slopes and crown of the new levee are protected by Bermuda grass sod. This was placed in 16-square-inch pieces on 18-inch centers this spring.

Clark & Sager incorporated both compacted fill with tractor equipment and cast fill with dragline equipment in the new structure. The job was originally planned to use tractor-drawn excavating equipment. But because of heavy rains and mud it was decided to modify the contract and use the dragline-casting method. Lot 1 of the original contract was for 240,000 cubic yards of compacted fill, excavated by tractor-scraper equipment. It was awarded for $0.254 per cubic yard. Lot 2, made up of 260,000 cubic yards of compacted fill, went for $0.27 per cubic yard. The subsequent modification of the contract eliminated compaction. The total contract price was $131,660.

Excavating and Fill Methods

The center line and both toes of the levee were staked by U. S. Army Engineer survey parties. All three of these points were staked every 100 feet.

The contractor, who had a minimum-equipment clause in his contract, moved in the following units in October, 1945:

15 Caterpillar D8 tractors
6 LeTourneau 12-yard Carryalls
7 LaPlant-Choate 9-yard scrapers
3 Super-C Tournapulls with FP scrapers
1 Lima 2½-yard dragline

This equipment list was augmented by renting from the U. S. Engineers the following machines:

10 Caterpillar D8 tractors
3 LeTourneau 12-yard Carryalls
1 Northwest 1¾-yard dragline
1 Northwest 2½-yard dragline

(*Concluded on next page*)

C. & E. M. Photo

"Wet grounds" marked the Clark & Sager contract for the construction of the Plum Bayou levee along the Arkansas River. In spite of mud, the work went on, as shown by the Northwest dragline in the background, casting levee fill in one 90-degree swing. The "lake" in the foreground is water in the borrow pit.

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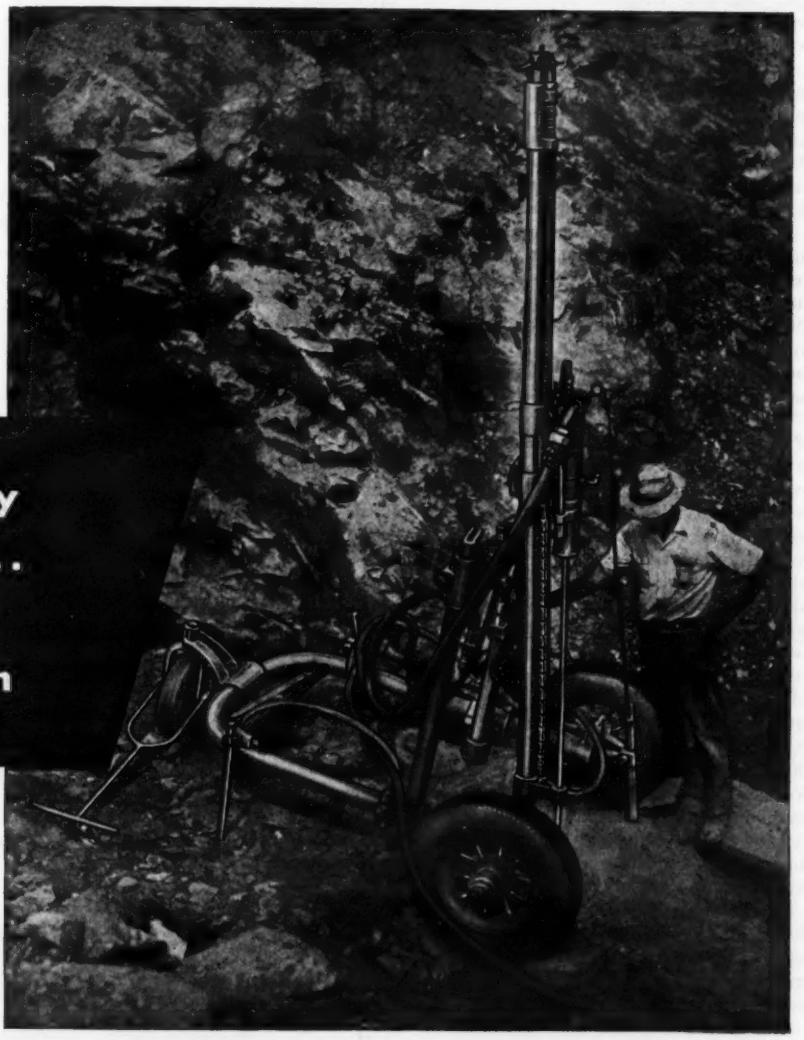

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Light-Weight
WAGON DRILL

Designed to drill holes at all angles on any terrain. Steady feed and quick return are features of the sturdy Chicago Pneumatic rotary air motor with graduated control, worm transmission and feed chain. There is ample power to pull tight steel.

However rough the terrain, the G-200 R Wagon Drill can be moved with ease and speed because the light, but rigid, tubular carriage is mounted on 3 roller-bearing pneumatic-tired wheels. Designed for fast operation; sliding cone permits rapid adjustments of drill steel to suit ground conditions.

The G-200 R Wagon Drill is available with CP-50 (3″), CP-60 (3½″) or CP-70 (4″) Drifters. Write for complete information.

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General Offices: 8 East 44th Street, New York 17, N. Y.

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Winter's Mud Fails To Halt Levee Work

(Continued from preceding page)

1 Bucyrus-Erie ¾-yard 20B dragline
1 Caterpillar No. 12 motor grader
1 Adams Model 511 motor grader

Tractor equipment was brought in first, and the borrow pit opened up. The new levee lay in comparatively clear ground, and scarcely any clearing or grubbing was necessary. The machines were scattered out, keeping free haul down to 250 feet as much as possible. The contractor concentrated on pushing dirt work in the early stages without too much regard for final grade. It was hoped to obtain the maximum possible yardage early in the job, though still responsible for final dressing of the slopes later on.

The heavy rains which fell in November slowed tractor-drawn scrapers from fourth gear to first. In December, when the downpour turned into a deluge, tractors bogged down even in first gear or stuck in the mud. In order to obtain as much as 75 per cent of struck capacity on the scrapers, it was necessary to employ a pusher tractor behind each tractor-scraper combination. Even then, the mud slowed dirt-placing work to a point where it was scarcely profitable to continue. As long as borrow-pit dirt had remained dry, it had been possible to dump it in 12-inch layers and compact it with the weight of heavy hauling equipment. But when the moisture content rose about 16 per cent in the more silty sections of the levee, hauling equipment had great difficulty in traveling over the embankment.

The erosion of the Arkansas River left bank at this locality was so serious, however, that Clark & Sager was allowed to bring in the dragline equipment already listed and continue its work. Wherever any of the draglines worked, mats had to be built of logs cabled together and fastened by Crosby cable clamps. These mats were built approximately 15 feet long x 6 feet wide, with lifting cables at one end to facilitate their placement.

Each of the draglines was equipped with a Hendrix dragline bucket. The draglines accounted for approximately 100 cubic yards per operating hour. No accurate figures on tractor-scraper performance were available, but at the peak of the job when 14 units were employed, 10,000 cubic yards of earth was being moved in two 10-hour shifts.

In the parts of the levee which were placed by tractor equipment with a fair degree of compaction, an allowance of 5 per cent was made for shrinkage. Where draglines were employed and casting was free without any compaction, 15 per cent allowance was made. The figure was based on previous experience with this type of soil.

Draglines and tractor equipment were serviced and fueled on the job. When the borrow pits and haul roads got too muddy, fuel tanks were set on log skids and towed out to the machines by one of the D8 tractors.

At the time the job was visited for CONTRACTORS AND ENGINEERS MONTHLY, the project was slightly better than 50 per cent complete as far as earth work was concerned. No sodding and very little slope dressing had been done because of the rainy weather. The contractor was proposing at that time to dress levee slopes by using dozer blades and possibly a limited amount of hand work. An abundance of Bermuda sod was available in the territory for slope protection.

L. B. Sager, one of the contracting partners, acted as Project Manager on the job, with L. V. Steinhoff as Superintendent. Colonel Roy D. Burdick, U. S. Army, is the District Engineer at Little Rock with R. L. Baird as Resident Engineer. W. N. Tracy and Roy Finney were in immediate charge of the field work and inspection as Resident Engineer Assistants.

Pile-Dike Bank Protection

A total of 1,960 linear feet of permeable pile dikes, similar to those used in the Mississippi and Missouri Rivers, are included in the W. P. McGeorge contract. These dikes, which are driven by floating pile drivers along the caving bank at the old levee, are as follows:

No.	Length (In Ft.)	Type (In Ft.)	Penetration (In Ft.)	Board Mattress
1	430	3-row, 18 c.c.	15-20	Shore end
2	355	3-row, 100; 2-row, 255	15-20	Shore end
3	290	3-row, 400; 2-row, 190	15-20	Shore end
4	195	3-row, 100; 2-row, 95	20-25	Total lengths
5	225	2-row, 15 c.c.	20-25	Total lengths
6	165	2-row, 15 c.c.	20-25	Total lengths
7	150	2-row, 15 c.c.	20-25	Total lengths
8	150	2-row, 15 c.c.	20-25	Total lengths

One floating driver, mounted on a wood hull, was towed up to the job from the McGeorge yard at Pine Bluff. It consisted of a No. 2 Vulcan pile hammer, a set of 60-foot timber leads, a 50-hp steam boiler, and an American 3-drum hoist. This pile driver is capable of driving 30 piles per 8-hour shift, and may exceed that if a water jet is used.

A lumber mattress was woven and ballasted in place contiguous with the river bed to prevent scour. Then the floating pile driver drives the permeable dikes in clumps of 3 piles each. The job was bid on this basis: six blows per foot at 20-foot penetration with a No. 2 Vulcan pile hammer, driving timber piles 15¼ inches in diameter at the butt and 5½ inches at the small end.

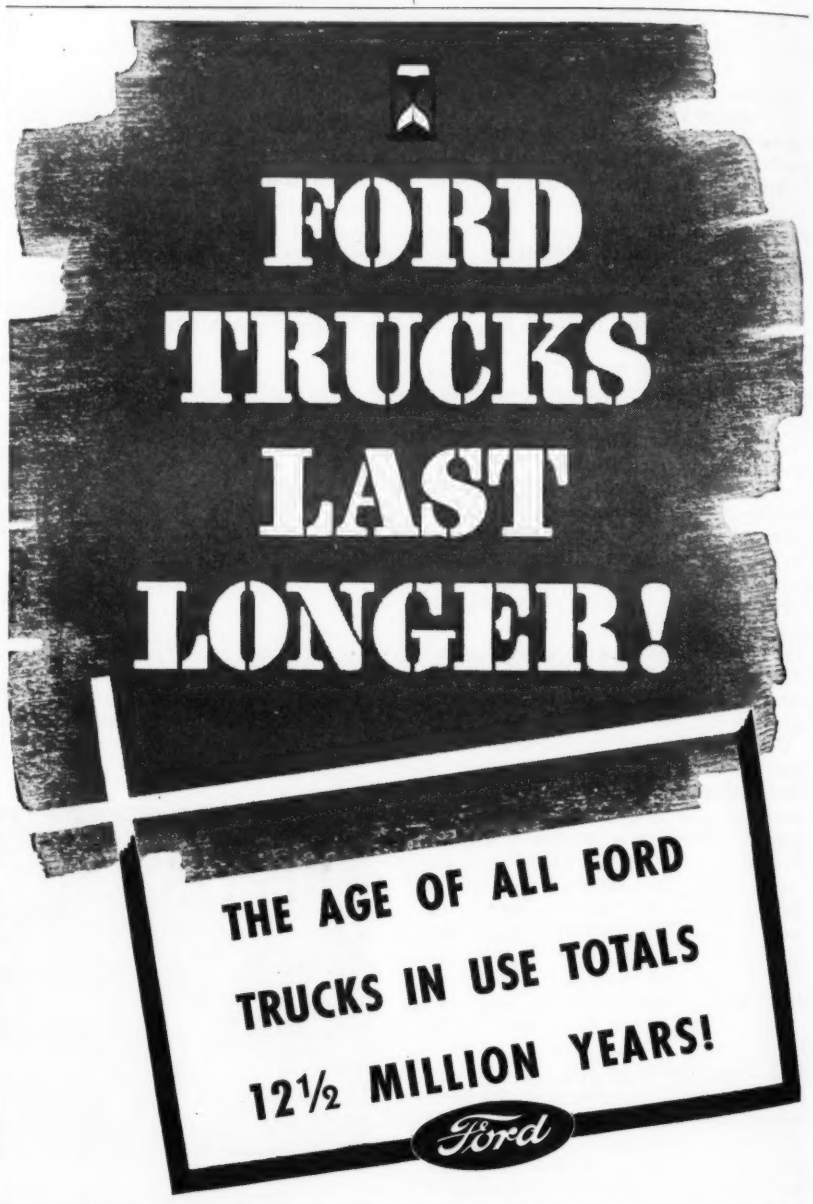
The rows of clumps are braced by stringers placed horizontally 4½ feet from the top of the pile clumps. They are secured by three turns of ⅜-inch galvanized-steel cable. Riverward ends of the dikes receive special clusters of piling securely lashed together to withstand heavy debris in the Arkansas River. If the pile-dike system works as designed, a load of red silt and sand will soon deposit behind the dikes. It will hold the left bank of the stream against future erosion. This work, which will safeguard both the old and the new levees, is now under way.

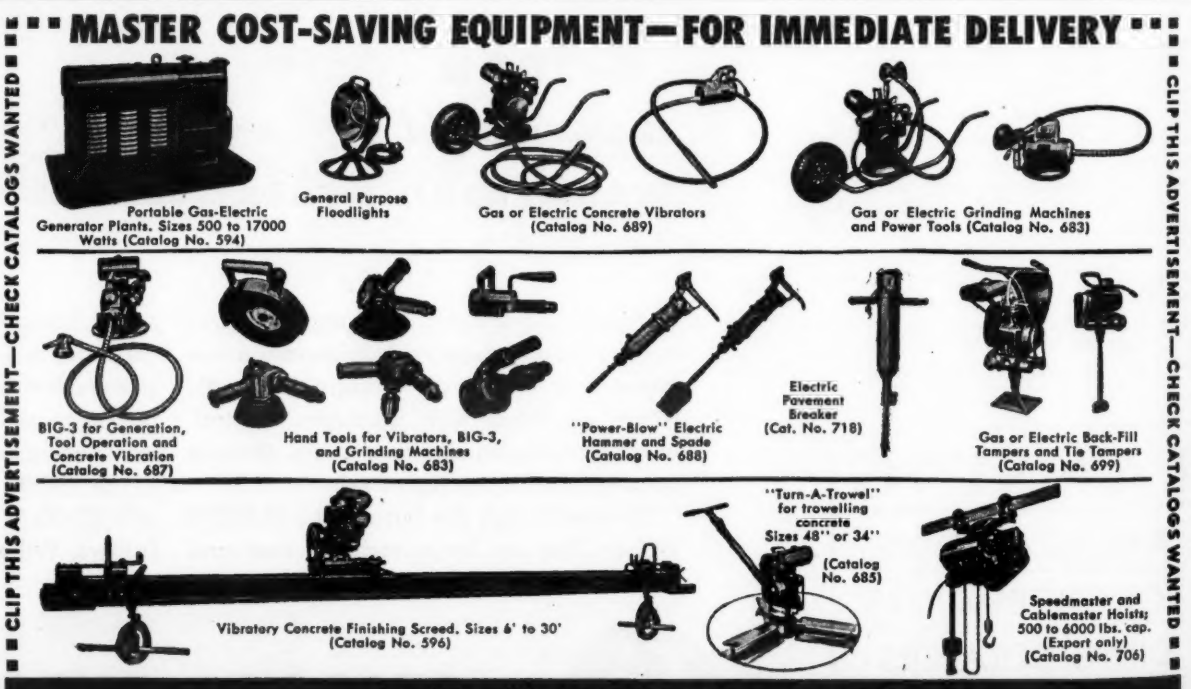
The total contract price for this part of the work is $103,000. The same U. S. Engineer Department personnel mentioned in connection with the levee project is supervising the McGeorge bank-protection operations.

Grease Dispensers

No contractor or highway engineer need be told twice about the importance of proper lubrication for his rolling equipment. To keep the necessary petroleum products handy and in good condition requires special containers and dispensers built for the particular material or application.

Pumps, tanks, nozzles, and similar grease-dispensing units, in a variety of styles and models for both field and shop use, are built by the Phillips Pump & Tank Co., Cincinnati 9, Ohio. Some are skid-mounted, others are on wheels, and still others are the drum-type small enough to be handled by one man. Both metered and non-metered models are available. The firm will send any interested reader of this magazine a 15-page handbook showing its products. Mention CONTRACTORS AND ENGINEERS MONTHLY when you write.

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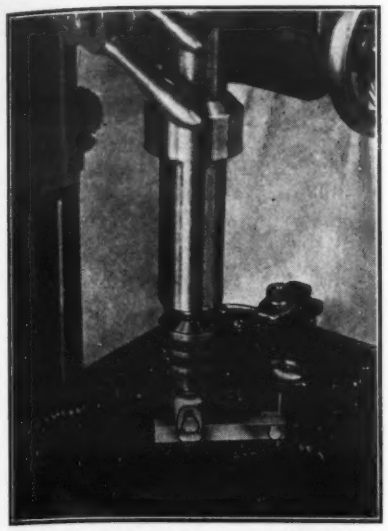

A recent addition to Bruno cutting tools is the adjustable circle cutter.

Tool Cuts Circles In Metal, Wood, Etc.

Circular holes can be cut in metals, wood, and plastic with a new shop tool developed by Bruno Tools. The firm has announced an adjustable circle cutter for use in drill presses, woodworking machines, or spindle machines. It is said to cut holes having diameters from 1⅞ to 8 inches through ¼-inch steels, or 1½-inch wood, plastic, or fiber.

A new feature on the cutter is its design which assures easy yet accurate adjustment. The tool comprises a combination drill and pilot with a new improved high-speed cutting blade, adjustable to depth and diameter. A special Wedge-lok blade holder permits the cutting edge to recede or yield from the work while maintaining steady pressure and feed.

The thickness capacities of the circle cutter can be doubled if the cut is taken from both sides of the material, Bruno says. A twin-blade holder, which has a fixed ½-inch center, cuts washers, wheels, disks, and gaskets in one operation.

The complete specifications of the Bruno adjustable hole cutters can be obtained on mention of this news report. Write Bruno Tools, 9330 Santa Monica Blvd., Beverly Hills, Calif.

Solvents Fight Dirt, Grit, Sludge, Rust

If engines are to run at top efficiency, they must be kept clean of the various detrimental deposits which form within them. Contractors and highway officials will be interested in a line of products offered for this purpose by Petroleum Solvents Corp. These products are used to remove the sludge, gum, and other formations from engines; to loosen up sludge-bound parts prior to an overhaul; and to clean fuel storage tanks.

One product, Loosite, cleans out the engine while another, Siloo, keeps it clean. Siloo Rust Eliminator prevents rust and retards overheating in the engine's water system. Still another, Siloo Gear-Case Flush, is for use in all types of transmission, differential, transfer, reduction, and hypoid gear cases.

Siloo for stationary or industrial engines can be used with all oils and fuels, including gasoline, diesel, natural gas, butane, distillate, etc.

Siloo Penetrant has a number of applications around the shop. Serving to prevent binding of metal parts, it combines the qualities of a remover and inhibitor of rust and gum, and a solvent cleaner. It is not injurious to paints and fabrics, the manufacturer states. Siloo fuel-oil-tank solvent is said to keep fuel storage tanks and fuel systems clean and to eliminate annual scouring. A special Siloo is also made for diesel injectors to aid in proper combustion without affecting engine performance, and to prevent clogging.

Full details on all these solvents can be secured by writing the Petroleum Solvents Corp., 331 Madison Ave., New York 17, N. Y. Just mention this news report.

Air-Powered Grinder For Use in Shop Work

A lightweight addition to its Air-Horse line of pneumatic shop tools has been announced by the Ideal Industries, Inc. The unit, a rotary file and die grinder, weighs only a pound. It has a normal speed of 19,000 rpm, but can reach 25,000 rpm.

The new tool is 6½ inches long and 1½ inches in diameter. It has a vane-type motor, and is available with either button or lever control. The motor is said to cool itself during operation. Grinding wheels up to 1½ inches in diameter can be used on the standard ¼-inch chuck. A collet chuck for shanks of ⅛ or 3/16 inch is also available.

The device can also be used as a tool-post grinder. Full details will be furnished on mention of this news item. Write the Ideal Industries, Inc., 1366 Park Ave., Sycamore, Ill.

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For air-entraining concrete

Safe and easy to use
Gives controlled air

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Book on Cost Fixing And Specifications

Any engineer who writes specifications will welcome this announcement from John Wiley & Sons. The second volume of Elwyn E. Seelye's "Data Book for Civil Engineers" has been published. Part of a 3-volume series, this 325-page book is called "Specifications and Costs". Volume I is titled "Design"; Volume III will be called "Field Practice".

In the first part of the book, Mr. Seelye presents typical specifications which can be put to use by altering words to suit the job in hand. Contract documents are cited, and specifications for various structures—airports, railroads, roads, bridges, docks, dams, drains, sewers, and water works—are given. Italicized hints and suggestions are inserted in the samples to help the engineer writing the specifications.

In the section on "Costs", the author has met the problem of cost variables by relating costs to *ENR's Building, Construction, and Material Indices,* and in many cases to a particular location. Indices given include wages, prices of materials, expenditures for various types of construction work, and recommendations for determining professional engineering fees.

An extensive glossary gives the volume added value. It covers such topics as airports, bituminous paving, cofferdams, underpinning, concrete, hydraulics in irrigation, piers and docks, plywood, roads, sewerage works, soils, steel, surveying, and wood.

Published by John Wiley & Sons, the book is priced at $6.75. Copies can be obtained through CONTRACTORS AND ENGINEERS MONTHLY.

New Wire-Rope Clamp

The safety and economy features of Safe-Line wire-rope clamps are detailed in a large broadside issued by the National Production Co. Guaranteed to hold the pull of any 6 or 7-strand wire rope, these clamps are made for 1/16 to ¾-inch rope sizes.

Copies of the broadside and other details can be obtained by writing the Safe-Line Clamp Division, National Production Co., 4561 St. Jean Ave., Detroit 13, Mich.

THE NEW GALION NO. 102 MOTOR GRADER

It has everything

This New GALION Heavy-Duty Grader has--

- Combination Manual and Hydraulic Steering
- Great Tractive Power
- Tremendous Blade Pressure
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- Finger-Tip Control
- Quick, Responsive Action
- Increased Ruggedness

You get these features in super-measure. They help you get your big jobs done fast and profitably. The NEW Galion No. 102 is designed and built to give top performance under the strains and stresses of power, pressure, and rough going on heavy work schedules that allow no letup.

A demonstration will quickly convince you. Galion Distributors are located everywhere--write for the name of the one nearest you.

To be "up" on the newest thing in motor graders, write for copy of new catalog No. 290. To be in line for delivery, place your order without delay for a NEW Galion No. 102 Motor Grader.

THE GALION IRON WORKS & MFG. CO.
Galion, Ohio, U. S. A.

GALION IRON WORKS
GRADERS · ROLLERS

★One stroke with a MallSaw cuts a board easily and smoothly . . . leaves a square board end . . . produces a better fitting member . . . saves hard-to-get lumber . . . salvages short pieces for use in concrete form construction . . . facilitates multiple cutting of like members and form boards.

★Each feature of the MallSaw is designed to maintain cutting speed. Perfect balance—with motor on long end of the board—makes a MallSaw easy to handle. A blower keeps the cutting line clear of sawdust. An automatic safety guard protects the operator.

★Easy adjustment for depth and bevel cuts and interchangeable blades and abrasive discs make the MallSaw adaptable to a wide variety of sawing-jobs, including cutting non-ferrous metals, cutting and scoring tile, stone, concrete, etc.

★Model 60 has 2" cutting capacity, Model 128 has 4½" capacity. Both are available in 2 voltages—110-volt AC-DC or 220-volt AC-DC. Pneumatic model with 4½" capacity also available.

Ask Your Distributor for MallSaws, Mall-Drills, Mall Concrete Vibrators, and Mall Chain Saws or write direct for literature and prices.

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★"25 Years of Better Tools For Better Work"

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Goggle-Cleaning Cabinet Encourages Shop Safety

The value of goggles as a safety factor is often diminished by dirty lenses. To combat this condition, the Mine Safety Appliances Co. of Pittsburgh has marketed a goggle-cleaning cabinet. Mounted in the shop for ready use, this unit provides a lens-cleaning, anti-fogging agent, and optical wiping tissues.

The MSA goggle-cleaning cabinet is described in Bulletin CE-28, available on request to shop superintendents and other readers of this magazine. Write Mine Safety Appliances Co. at Braddock, Thomas, and Meade Sts., Pittsburgh, Pa.

I-H Truck Staff Shifts

The appointment of two assistants to the Sales Manager, W. K. Perkins, has been announced by the Motor Truck Division of International Harvester. L. W. Pierson will aid him on national and fleet account sales, and R. M. Buzard on the operational phases of the business.

J. T. Sullivan, Central District Manager, has replaced Mr. Pierson as Manager for the Southwest District, and has in turn been succeeded by E. H. Watkins, formerly Assistant Manager for the Eastern District.

Mr. Buzard's duties as Manager of the Western District have been assumed by R. S. Byers, formerly Manager of the Eastern District. Byers' post has been taken over by R. W. Dibble, formerly Manager of the Sales Operation Research Department.

New Pump Literature

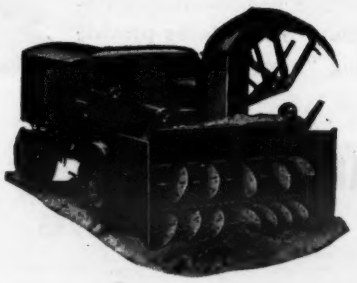
Pumps that handle capacities from 10 to 75 gpm, at pressures up to 200 pounds, are described in a new bulletin issued by Economy Pumps, Inc., Hamilton, Ohio. The literature, Form B-346, describes the vertically split-case multi-stage high-pressure centrifugal pumps made by Economy. Copies of the bulletin can be secured by writing the firm at the above address. Say you saw this notice.

Allied Outlet in Mass.

Supplies made by Allied Steel Products, Inc., of Cleveland are now available in Connecticut, Rhode Island, and western Massachusetts. The firm has appointed the Taft Welding Equipment Co., 3171 Main St., Springfield, Mass., as its agent for Bulldog Grip-Lugs, Mango repointer bars, and Excelloy hard-surfacing material.

with a SICARD SNOW BLOWER

. . . This performance was maintained throughout the winter season, under a variety of snow and ice conditions and is taken from the record of a Canadian city engineer. It shows that the Sicard Snow Blower can stand the keenest investigation and comparison. Other records show that *one* Sicard Snow Blower can save its initial cost in as short a period as one season. Handles any type of snow, wet or dry, even clears ice. Its service life is long, too—the first Sicard Snow Blower was built in 1927 and is still in use.



SICARD

SNOW BLOWERS

The Porta-Desk opened up provides desk and cabinet space for field offices.

Pack Up Your Desk And Move to Next Job

You may have to wait for your order to be filled, but you will be interested in a portable field desk being built by Engineered Products Co. And you can read all about the miniature office in a bulletin just issued by the manufacturer.

Conceived by an engineer, Porta-Desk is a 26 x 29 x 11-inch box when folded. Opened up, it becomes a desk-cabinet combination. The unit holds typewriter, catalogs, sketches, papers, T-square, and all your other desk paraphernalia, the manufacturer says.

The desk top is made of formica plastic set on plywood. It is trimmed with stainless steel and trued to accommodate the T-square at either end. Scotch tape will hold papers and charts firmly on the formica. The table hinges on one end of the cabinet and rests on two legs. This gives the cabinet top as an additional working space.

Porta-Desk is in limited supply these days, but Engineered Products Co., 1127 E. 31st St., Kansas City 3, Mo., will be glad to send further information on this development. Tell the firm you read this news report in CONTRACTORS AND ENGINEERS MONTHLY.

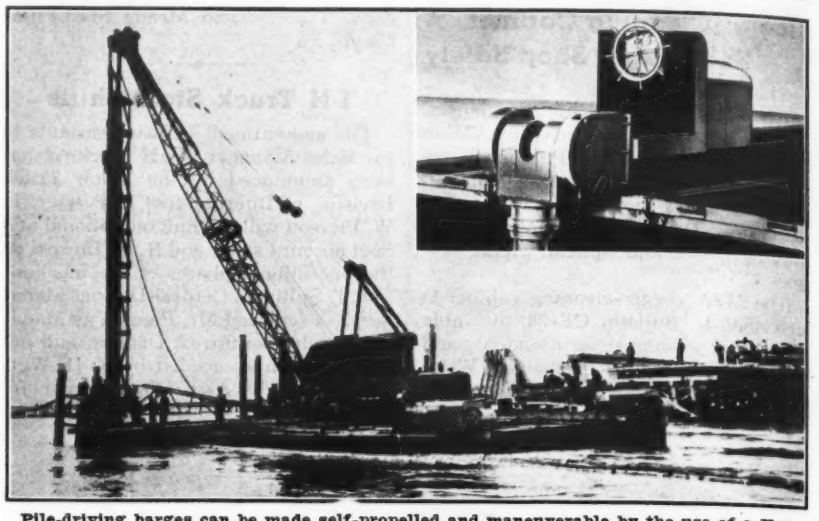
Jobs on or Near Water Aided by Power Unit

During the days ahead, one of the many problems in connection with proposed construction projects will be that of accessibility. Moving cumbersome equipment and heavy machines to remote or hard-to-reach job sites is often costly. Yet when water is near the job location, this need not be so. Machinery and supplies can be moved to or near the site by boat or barge. In some instances, equipment can be mounted on and work from the watercraft.

The Harbormaster, an outboard engine made by Murray & Tregurtha of Boston, is applicable to these construction needs. Mounted as a unit and originally designed for invasion pontoon barges, the Harbormaster is built in sizes from 20 to 330 hp, gasoline or diesel-powered. It will both drive and steer conventional craft, as well as barges, flatboats, or homemade rafts carrying units of equipment.

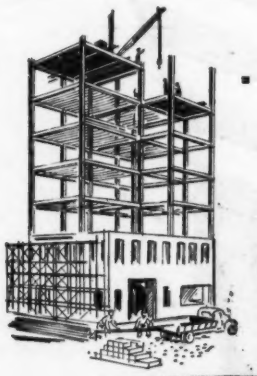
High maneuverability and safety in shallow water are said to be prime features of Harbormaster-driven craft. The engine is so built that steering with full power is possible in any direction, the manufacturer explains. And a shear-pin arrangement allows the entire submerged section of the Harbormaster propeller to rise, free from damage, up and over an underwater obstruction.

Drydocking the vessel is not needed in order to repair the submerged assembly, since it can be raised 180 degrees out of the water. On-the-spot repairs are further facilitated by precision-built parts. Thrust efficiency is achieved by elimination of the shaft housing.



Pile-driving barges can be made self-propelled and maneuverable by the use of a Harbormaster. The outfit in this U. S. Army Signal Corps photo is shown in service in Antwerp harbor. Inset, a close-up of the Harbormaster.

Murray & Tregurtha, Inc., 32 Hancock St., Quincy 71, Mass., will be glad to tell you how such a marine engine can be of use in your operations.



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DUFF-NORTON JACKS

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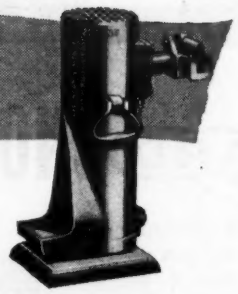
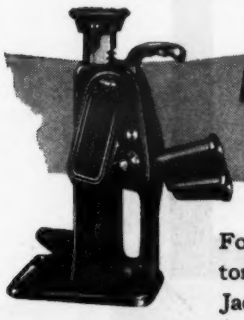


For that heavy lifting and lowering, Duff-Norton Heavy Duty Screw Jacks provide the easy-operating "mechanical muscles."



AUTOMATIC LOWERING JACKS
5 to 25 TONS

For speedy operation on loads up to 25 tons, Duff-Norton Automatic Lowering Jacks are safe, dependable and economical.

WRITE for descriptive bulletins on Duff-Norton Jacks for construction work!

THE DUFF-NORTON MANUFACTURING COMPANY
P. O. BOX 1889, PITTSBURGH 30, PA.
RATCHET JACKS, SCREW JACKS, AIR POWER AND HYDRAULIC JACKS
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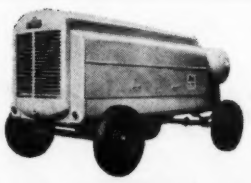
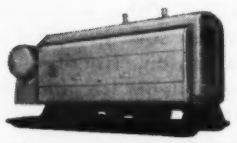
AT LOWER COST

. . . Improved Air Tool Performance with a new Le Roi AIRMASTER



Four-wheel mountings have automotive steering and semi-elliptical springs for high-speed towing.



Skid mountings are available for all sizes of Le Roi AIRMASTERS.

The new Le Roi AIRMASTER line is the greatest development in post-war air compressor design. A complete range of mountings and sizes is available from 60 to 500 c.f.m. for gasoline- or diesel-engine operation. Here are a few of the many revolutionary features that provide low-cost air and better air tool performance:

The patented Econotrol adjusts engine speed to the demand for air — acceleration and deceleration are gradual; fuel economy greater; engine and compressor life longer. In addition, the Econotrol maintains higher average working pressures so that air tools do more work.

Cushioned, Super-finished AIRMASTER Valves provide the most efficient, trouble-free means of delivering air.

The new AIRMASTER Intercooler Design guarantees dry, cool, oil-free air. Hose lasts longer and does not clog your drills.

Start using AIRMASTERS today—it's an easy way to improve your cost picture. Write for bulletins that describe in detail the sturdy unit-construction; the extra-heavy, balanced crankshafts; pressure lubrication; heavy-duty clutch, and other Le Roi advances in compressor design.

LE ROI COMPANY
MILWAUKEE 14, WISCONSIN
New York • Washington • Birmingham • Tulsa • San Francisco

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Nonresident Corporations Should "Watch Their Step"

"No Trespassing, Foreign Corporations: You can do no business in this state until and unless you go through certain formalities at the office of the Secretary of State and designate some person in the state on whom summons can be served if one of our citizens has a hanker to sue you."

Invisibly, such a warning is posted all around the border of most, if not all, states. But, in effect and in black and white, it is to be found in the statute books of the state and the decisions of its courts. So, when a nonresident corporation pulls up at a state border, it behooves it to do what one does before crossing a railroad track, "Stop, Look, and Listen". Draw up your chair and list to what happened to an Alabama contracting company that constructed a state road job in Mississippi. The company carefully paid a local license tax for the privilege of bidding on the job, but for months it overlooked the necessity of filing a copy of its charter with the Secretary of State, appoint an agent for service of process, et cetera.

After completing the contract work, the company sued the Mississippi Highway Commission for additional compensation and for delay damages caused by the Commission. It was denied right to recover those items under the original contract, because the contract was entered into and the work begun several months before the company qualified to do business in the state. But right to recover for extra work done under a new contract entered into after the company had so qualified was allowed. (Newell Contracting Co. v. State Highway Commission, 15 So. 2d, 700.)

Mississippi happened to be one of those states which penalize a nonresident corporation which has not complied with the local laws requiring a permit before doing business in the state, by invalidating its contracts and barring recovery on them. In many other states less drastic penalties are imposed.

Was Contract Valid?

The Mississippi Supreme Court rejected a contention made on behalf of the company that since its contract was "one isolated transaction," the company should not be deemed to have done business in the state within the meaning of the statutes involved. The court said: "The usual test of determining whether or not a foreign corporation is doing business within the meaning of our statutes is whether or not it is doing such acts as are within the function of its corporate powers, and *where the business so performed is substantial in scope such corporation is held to be doing business.*"

The Commission did not raise the questions concerning the validity of the contract until after the suit had been pending for three years and until the trial was near the end. Under such circumstances, the company's lawyers argued that the Commission had waived the defense of noncompliance with the statutes. But the Supreme Court said "No," observing that the Commission had had a right to assume that the company had complied with the statutes, without making any investigation; and that the company was conclusively presumed to have known from the start that failure to comply with the statutes would invalidate its contract and bar suit on it.

Mr. Justice Roberds of the Supreme Court did not agree with his brethren on this question of waiver of the defense. He argued: "It might be assumed with much reason and justification, that the Highway Commission, in letting these public contracts to nonresident corporations, would naturally have in mind whether the contractor is authorized under the laws of Mississippi to enter into and perform and enforce such contracts in this state. The information can be gotten by the simple act of telephoning the office of the Secretary of State. It is public information. It was not concealed from the defendant. It could have been ascertained one moment as well as any other. But be that as it may, the majority opinion recognizes the extreme harshness of these statutes. The Commission accepted the contract and the State has gotten the benefit of the work."

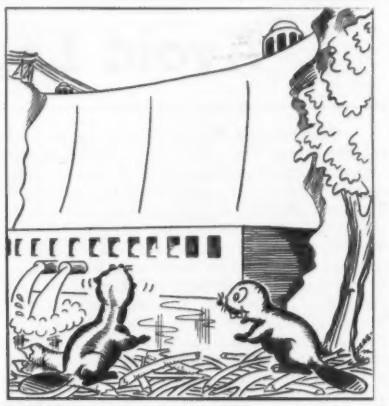
Unfortunately, a dissenting opinion does not alter the effect of the majority decision.

Case Clarifies Rights In Government Contracts

Several important legal questions applicable to all kinds of construction contracts, especially Government jobs, were answered recently by the United States Court of Claims. (Henry Ericsson Co. v. United States, 62 Fed. Supp. 312.) The contract in the case was for a Government housing project.

The court denied the contractor an allowance for installations which it claimed were not covered by ambiguous specifications, because the contractor did not appeal from an adverse decision made on that point by the contracting officer. The contract provided that such decisions be appealed to the head of a department.

In the data upon which the contractor made its bid, there was a contradiction between drawings and a map as to whether



"WHAT an eager beaver HE must've been!"

certain tree pits were required to be constructed. Because the contractor did not seek a clarification of this contradiction, the court held that the Government was entitled to deduct the cost of excavating the pits not prepared by the contractor.

On the housing project, the Government was guilty of 17 days' delay in providing steam needed by the contractor to clean and

(*Concluded on next page*)

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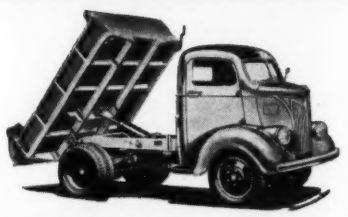
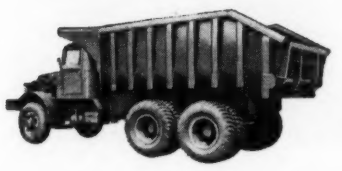


Type C12 Body and Model D6 or D7 Hoist. Dumping angle 55°.



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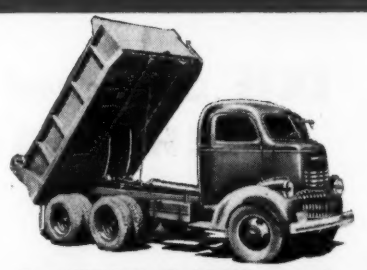
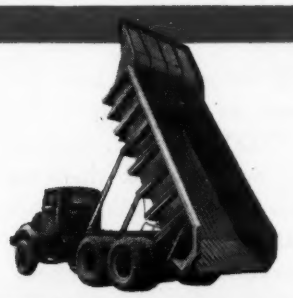
Special rock Body, scoop type rear end. Model F4CA cam and roller Hoist.

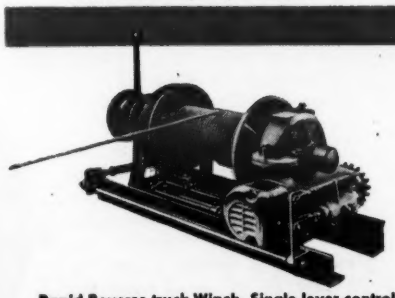


Type W12 Body. Model F4C cam and roller Hoist. Capacity 6 cu. yds.



Type X-112 Extra heavy duty Body, scoop end, with Model T-4440 Hoist. Capacity 19 cu. yds.

Type W12 Body, front recessed for Model TV83 Hoist. Capacity 15 cu. yds.



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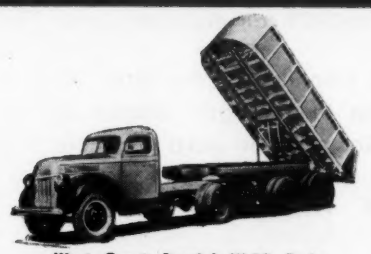

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Avoid Legal Pitfalls

(*Continued from preceding page*)

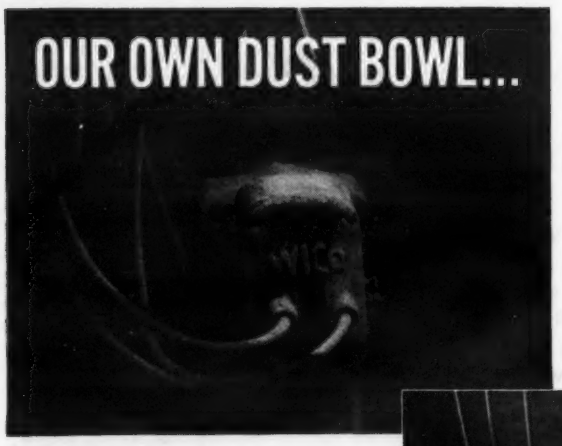
test radiators. The delay resulted from the Government's unexplained tardiness in signing a contract with a public-utility company. The court allowed damages to the contractor.

Summarized, other points decided by the Court of Claims are as follows: In computing damages awarded the contractor for delayed performance, compensation should be allowed for idleness of the contractor's machinery. But it should be allowed for only one-half of the fair rental value, because wear and tear that would have been caused by use of the equipment was absent during the delay. Main-office overhead proportioned to the job and to the delays was also allowed as an item of damage. But it was not to be as much office expense as was involved in a retroactive increase of salaries of the officers and owners of the contracting company. The contractor's acceptance of orders changing the work to be done did not preclude a claim for damages for being delayed in performing the contract (1) where there was no relationship between the changes and the delays, and (2) where the changes were not agreed to as involving a compromise of the contractor's claim on account of delay.

Release by Owner or Lessee of Adjacent Land

There are undoubtedly situations in which a public contractor whose work entails injury to adjacent lands will find it advisable, if not necessary, to secure releases from the owners and/or lessees of such lands. And probably situations could arise where a *lessee* might have rights which only he could release. However, as to injury which is a necessary incident of the work, it seems that ordinarily a release given by the landowners to the government or public body which makes the improvement automatically serves to release the contractor.

One of the interesting decisions to be found in the law reports on this point was decided a few years ago by the Florida Supreme Court. (Hendry v. Atlantic Dredging & Construction Co., 191 So. 525.) In that case, Hendry, a lessee of pasture land in Florida, lost a suit to hold the defendant-contractor liable for flooding of lands. The flooding was incident to construction of dams on a Federal land-reclamation project. The case turned upon the fact that the owner of the land had signed a release, which, after reciting benefits which would accrue to him from the improvement, declared that he gave the Government, its officers, *contractors*, etc., right to enter upon the land to deposit earth, spoil, etc., and released them from liability for damages, etc. The Florida Supreme Court said: "It is hard to conceive how a release might have been phrased to more adequately protect the Government and the Government's contractors from any damage which might accrue to the lands or the use thereof by reason of the performance of the contract to accomplish the drainage contemplated."



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Slopes Are Seeded And Mulched by Hand

Calcium Chloride and Slag Screenings Stabilize 8-Foot Shoulders on 8-Mile-Long Concrete-Paving Contract

✦ MANY items made up the recently completed 8-mile concrete-paving contract on U. S. 213, between Cambridge and Vienna in Dorchester County, Maryland. Not the least important was 142,000 square yards of seeding and mulching. This work was done entirely by hand labor, plus the services of one patient, plodding horse. Some of it was done last autumn, and the lush mat of grass now growing on the highway slopes attests the quality of both materials and methods used. The remainder and greater portion of the work was done in the planting season this spring.

The Maryland State Roads Commission divided the project into two contracts, but both were awarded to the Williams Construction Co. of Middle River, Md., on its low bids totaling $637,294. Work began on this Eastern Shore highway in September, 1944, and the grading, drainage, and 24-foot reinforced-concrete paving was completed one year later. Seeding and mulching are permitted only during the spring and fall planting seasons, so this work was divided. Part of it was done from September 20 to October 15 last year, and the remainder was finished this spring. The spring season extends from March 15 to May 1.

All fill and cut slopes adjacent to the 18-inch side ditches have been seeded and mulched. These slopes are 4 on 1 with one exception. Where the fills are over 6 feet high, the slopes are steepened to 2 on 1. During the grading, the topsoil was removed and stockpiled for use later in dressing the slopes. Power graders first shaped the slopes to neat lines, and also cut a 4-inch-deep trench in the 8-foot shoulders, windrowing the material to the outside edge of the shoulders.

Shoulder Stabilization

The shoulder trench was then filled with slag screenings purchased from the Arundel Corp. of Baltimore, Md. They were shipped in gondola cars via the Pennsylvania railroad to Linkwood, about the center of the job, where the contractor had set up his yard and batch plant on a siding. Here the screenings were unloaded by a crane and clamshell bucket into trucks which hauled the material to the road. It was dumped into the shallow trench and leveled off by the graders. The 8-foot shoulders were then rolled by a 3-wheel roller with a specified maximum weight of 6 tons, to a slope of ½ inch to the foot.

The 4-inch layer of screenings was given an application of calcium chloride at the rate of 1 pound to the square yard, and after a 2-week interval a similar quantity was applied. For this operation a local farmer was engaged who used a lime sower to apply the chloride. A total of 76,500 square yards of shoulder was stabilized in this manner. The gradation of the No. 10 slag screenings was as follows:

Sieve Size	Per Cent Passing
¾-inch	100
⅜-inch	90-100
No. 100	10-30

Seeding

Before any seeding was done, the slopes were given a final hand dressing of material from the windrow at the outside edge of the shoulder. Three laborers with long-handled shovels tossed this dirt down the slopes. They then smoothed and patted it into position on top of the 4 to 6-inch layer of topsoil forming the upper crust of the slopes. Thus all holes and surface indentations were filled, and the slopes had a well manicured appearance before the seeding was begun.

C. & E. M. Photo

On the Williams Construction Co. 8-mile concrete-paving contract in Maryland, seeding and mulching the slopes were included in the work. The laborer in the foreground is hand-casting the seed, followed by another spreading fertilizer by hand.

Two other laborers then walked over the slopes, one with a pail of seed and the other with a pail of fertilizer. Each distributed the contents of his pail by hand. One worked a few feet in back of the other, but no order was required as to whether the seed or fertilizer was sown first. The seed, which was distributed at the rate of 2½ to 3 pounds

(*Continued on next page*)

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C. & E. M. Photo

A rarity on construction jobs now, a patient plodding horse was used to pull a 4 x 4-foot spike-tooth harrow over the slopes to loosen the topsoil.

Slopes Are Seeded And Mulched by Hand

(Continued from preceding page)

per 1,000 square feet, was composed of the following mixture:

Kind	Per Cent
Creeping red fescue	20
Orchard grass	20
Redtop	15
Domestic rye	15
Hairy vetch	15
Lespedeza Korean	15
	100

After a little practice the sowers learned just about the right amount to scatter in order to meet the quantity requirements. Thus if the slope happened to be 9 feet in width, a stretch 111 feet long was marked out and the 2½ to 3 pounds of seed was proportioned over this area.

The fertilizer, Swift's Red Steer brand, was a 4-12-4 mixture containing nitrogen, phosphoric acid, and potash in that order. It was distributed at the rate of 40 pounds per 1,000 square feet. Following the sowers came a man leading a horse which pulled a 4 x 4-foot harrow with spike teeth 2½ inches long projecting ¼ inch below the harrow frame. The purpose of this operation was to loosen the topsoil to a depth of at least ¼ inch. Harrowing began at the toe of the slope and was continued back and forth along the slope until the top was reached, the horse moving higher at each pass. Usually a stretch about 500 feet long was done at a time.

Mulching

Right after the harrowing, a gang of about eight spread mulch over the slopes to a depth of from 1½ to 3 inches. The 18 x 18 x 36-inch bales of mulch, generally purchased from local farmers, had previously been dispersed along the shoulders. The twine or wire with which they were bound was cut, and the mulch spread by hand. Obtaining the mulch was a problem at times. Wherever possible, straw, which was purchased for 15 cents a bale, was used. This material was easier to put on, since it shook out more quickly and spread more smoothly than the hay mulch which had to be used when the straw was not available.

The hay usually was a combination of old, cured, and weathered field grass, broom sedge, honeysuckle, or small cuttings considered unfit for stock. But as this was not always obtainable, better-quality stock hay had to be bought. The price for this material averaged 30 cents for a 40-pound bale, or 50 cents for a 90-pound bale. The contractor lopped a little off this price at times by sending four of his own men around to the farm to do his own baling. But he was charged 10 cents a bale for the use of the baling machine. Considering that from 300 to 400 bales were used in a day during the seeding period, the cost of mulching ran high.

C. & E. M. Photo

Directly behind the harrow, a gang of 8 men spreads the layer of mulch.

After the mulch was spread, it next had to be held on the slopes so that it would do some good. To hold the mulch in place wooden stakes were driven into the slopes on 5-foot centers both ways, and binder twine wound around them, crisscrossing back and forth. The lacing network of twine prevented the wind from scattering the mulch. The work

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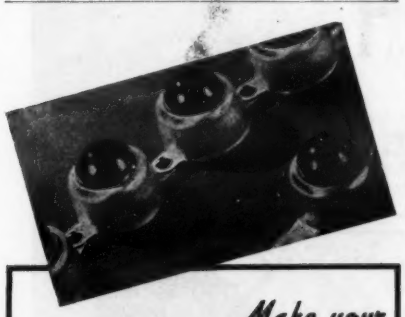

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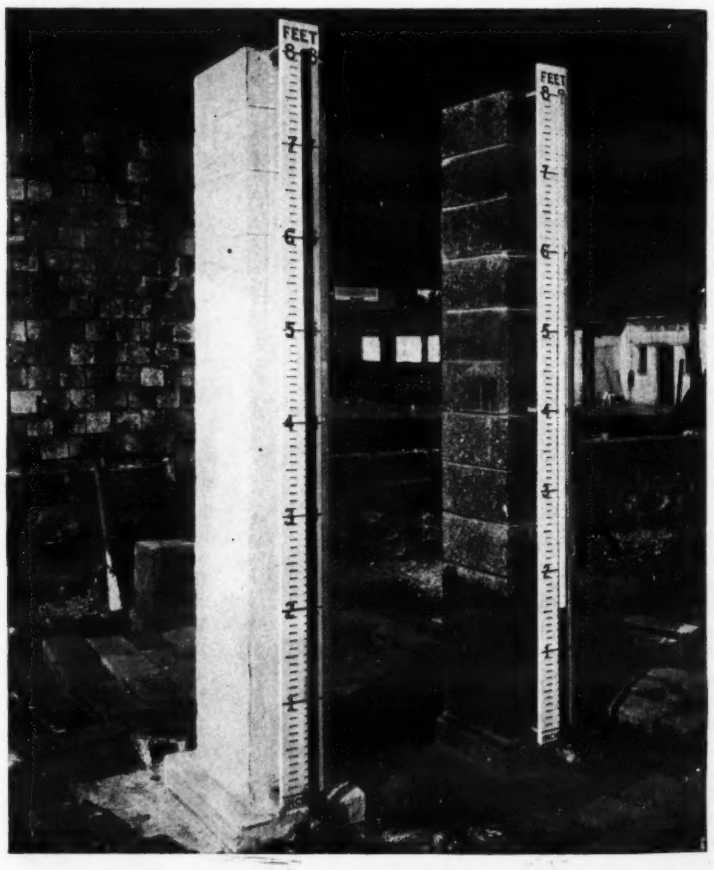

The Aquellized column, at left, holds an 8-ft. head of water (500 lbs. per sq. ft. at the base); the untreated column offers no practical restriction to the flow of the water through its walls.

The two columns you see here were set up to determine the effect of a hydrostatic pressure created by an 8-ft. head of water on a surface treated with Aquella.

Both columns were made of highly porous cinder blocks, with an absorption rate of 15% by weight.

First, both columns were tested in their natural state and showed that they had identical coefficients for permeability. After such tests, the column on the *left* was treated with Aquella, while the one on the *right* was not.

The Aquellized column withstood the pressure of an 8-ft. head of water, equivalent to a hydrostatic pressure of approximately 500 lbs. per sq. ft., at the base.

The untreated column could not be filled with water higher than 18¾", because the water seeped through its cinder blocks at the rate of 2 gallons per minute.

Tests prescribed by the U. S. Bureau of Standards call for a maximum 2-inch head of water, or 10 lbs. pressure per sq. ft. The test described here is therefore approximately 50 times more severe than that prescribed by the U. S. Bureau of Standards.

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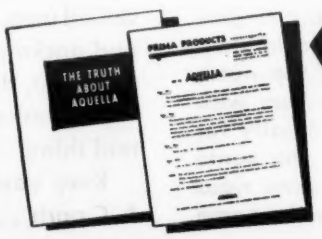

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Slopes Are Seeded And Mulched by Hand

(Continued from preceding page)

of stake driving was speeded by the use of an 8 x 5-foot wooden template. One man carried it and set it on the shoulder with one of its 5-foot sides bearing along the concrete pavement. Another man then drove stakes at each end of the other 5-foot side. The result was a neat row of stakes at the edge of the shoulder. A third man with a stick 5 feet long then worked down the slopes continuing the line of stakes at right angles to the road.

The stakes or pegs were 1 x 1 x 8 inches long. They were driven only about half way into the ground to leave enough wood protruding so that the twine could be wound around the top. Then a laborer used a ball of binder twine and a 3-foot-long stick, into which a staple had been driven at the lower end, to pass the twine around the tops of the pegs. By feeding the twine through the staple loop, the man speedily stretched it over the ground as he walked along, without having to stoop to do his work. Two others followed behind driving the stakes flush with the ground, thereby drawing the twine down tightly over the mulch. When finished, the pattern was a series of 5-foot squares of twine with diagonals crossing in both directions. This was the last operation in the seeding and mulching on which the contractor's bid price was 10 cents a square yard.

Personnel

This newly built 8-mile section of U. S. 213, with its 24-foot concrete pavement, wide stabilized shoulders, and good-looking grassy slopes which will check erosion, was designed and its construction supervised by the Maryland State Roads Commission. Wilson T. Ballard is Chief Engineer, with T. M. Linthicum, Assistant Construction Engineer. Resident Engineer on the project was J. T. Price, assisted by Inspectors Nicholas D. Norris and C. Price Rolph. Jerry Barnhill was Superintendent for Williams Construction Co. and Victor Wolf was Foreman on the seeding and mulching work.

C. & E. M. Photo
The contractor devised a wood template to speed up driving the stakes to hold the mulch in place.

Kentucky Department Sets Safety Example

Safety begins at home, Commissioner J. Stephen Watkins of the Kentucky Department of Highway says, announcing the reorganization of the Department's safety section. Under the new set-up, safety inspectors have been appointed in each of the seven highway districts.

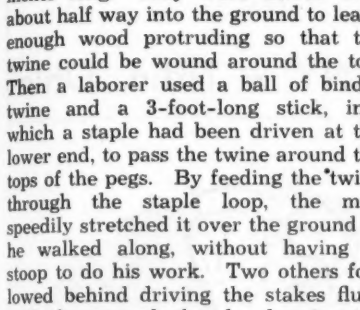
These inspectors will enforce safety regulations under the supervision of Thomas H. Cutler, State Highway Engineer, with J. W. Knox, State Safety Engineer, directing the program. The inspectors appointed are: R. S. Candill, Frankfort; O. P. Cornelison, Richmond; J. I. Popplewell, Louisville; L. H. Ramsey, Lexington; J. F. Deskins, Pikeville; H. O. Morgan, Berea; and J. U. Courtney, Lexington.

The program calls for the reduction of accidents among the highway forces. Steps to be taken include the establishment of standards that will bar the employment of inexperienced or unqualified men. Safety principles are to be advanced among the drivers and mechanics who operate the Department's 123 garages and 2,988 pieces of mobile equipment. Educational activities, physical check-ups, accident investigations, and fire precautions are other features of the program.

Dealer in Delmarva Area

Sales, service, and rental facilities are available to contractors in the Delmarva Peninsula area of Delaware, Maryland, and Virginia, through a newly formed organization, Nesbitt & Miller Equipment Co. Located at Salisbury, Md., the firm is a partnership of Ray Nesbitt, formerly with the Standard Equipment Co. of Wilkes-Barre, Pa., and Richard H. Miller.

At present Nesbitt & Miller represents the Le Roi Co., Barnes Mfg. Co., Master Vibrator Co., Erie Steel Construction Co., Red Star Products, Inc., Porter-Cable Machine Co., Goodall Rubber Co., and Jackson Mfg. Co.



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5-Ton "General Utility"	250 ft.	1/8"
15-Ton Triple-Geared "Special"	1200 ft.	1/2"

With patent gear change and positive internal brake that never fails, and will lock load.

Gear Ration	Weight	Price
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5-Ton 4 & 24 to 1	110 lb.	75
15-Ton 4, 19 & 109 to 1	680 lb.	250

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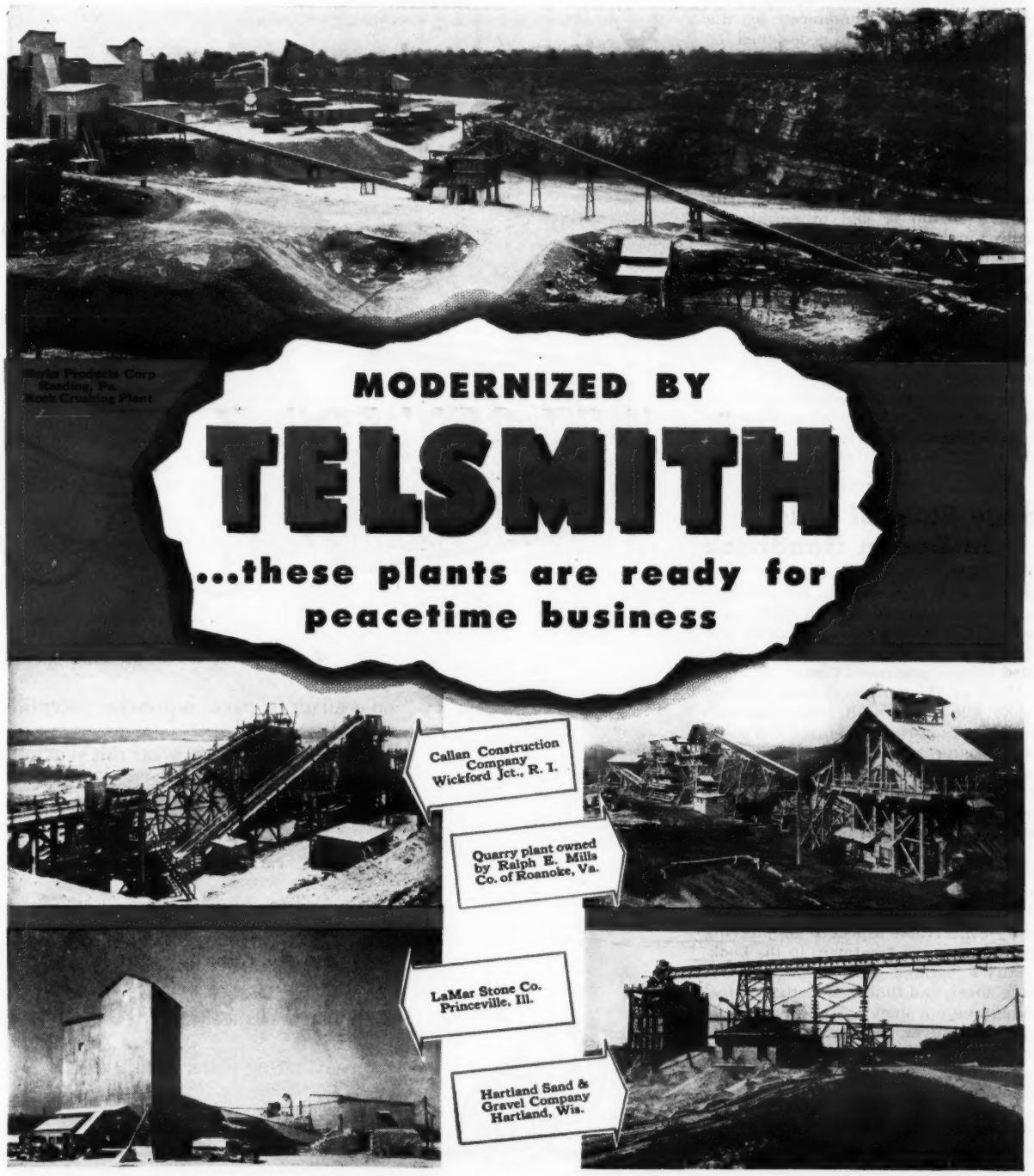
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Plan *your* modernization, expansion, or new plant *now.* Telsmith's 40 years of engineering *know-how* in plant-designing and equipment-building is at your disposal. Consultation without obligation.

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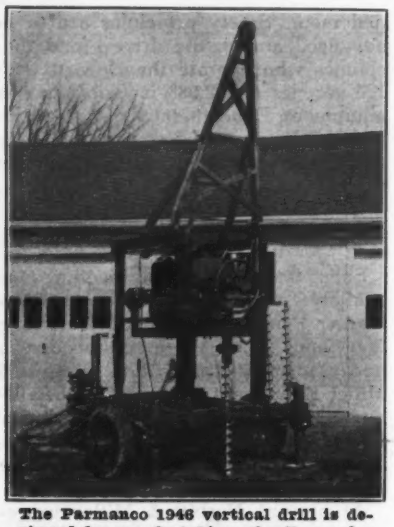

The Parmanco 1946 vertical drill is designed for speedy taking of soil samples or for blast-hole drilling in any rock except solid limestone.

Vertical Drill Has Movable-Bed Feature

Field tests have been completed on a new vertical drill announced by the Paris Mfg. Co. The drill is designed for taking soil samples and for blast-hole drilling in all but solid limestone. It is recommended for use at 50 to 60 feet with 4½-inch equipment, and is said to stand up well when used for greater depths.

A movable bed for its drill and winch unit features this 1946 Parmanco drill. Such a set-up is said to permit the drilling and auger-pulling operations to be done without moving the position of the machine; to eliminate loss of time in hole and drill-shaft realignment after the augers have been pulled for cutting samples; and to allow quick sample procurement at desired depth intervals.

Further details and specifications on this new Parmanco vertical drill can be obtained by writing the Paris Mfg. Co., Paris, Ill. Mention this news report.

Huge Store of Data In Design Handbook

Dr. Alois Cibulka, a practicing engineer as well as a teacher, has recently prepared a practical handbook for engineers. Containing some 500 pages, it is filled with practical information compiled to save engineers time.

Much of the work was hand-printed by Dr. Cibulka himself, before publication, because printers refused the pages as too expensive to set in type. Its various data have been boiled down from the educator's lecture notes. The manual actually features, he claims, ten engineering books in one.

Much of the material Dr. Cibulka presents he worked out once so that he could use it time and again in the solution of engineering problems. Almost every conceivable aspect of engineering design gets some treatment in the book.

Part I features general theory; concrete, steel, and timber structures; steel and aluminum shapes. Modern welded-steel structures, reinforced-steel timbers, and details of modern city planning are found in Part II. Part III is devoted to rigid frames and statically indeterminate structures. Part IV deals with pressure and vacuum vessels, and piping. Part V is devoted to refinery piping.

Shafts, gears, belts, and metals feature Part VI, and hydraulics, pumps, heat transfer, insulation, etc., Part VII. Oils, hydrocarbons, and chemicals are found in Part VIII, and aerial cable tramways, drilling rigs, and guylines in Part IX. The final section is devoted to numbers, conversion tables, curves, stadia, electric data, and nomographs.

The book includes a number of sections formerly published separately, as well as data on Vierendeel trusses, television towers, hangars, pre-stressed concrete tanks, and hydraulic dams. Charts, diagrams, designs, tables, and drawings, found throughout the book's 12 x 9-inch pages, are all highly legible.

"Practical Design Handbook for Engineers" is undoubtedly an engineering education in itself. Copies are priced at $6 each. They can be obtained from Clarke & Courts, 1210 W. Clay St., Houston 6, Texas, or from the Reader Service Department of CONTRACTORS AND ENGINEERS MONTHLY.

Tamping-Roller Bulletin

Maximum compaction with little disturbance to surrounding material is claimed for the Model 22 Gebhard tamping roller. A new bulletin about it is available from the Shovel Supply Co., 4900 Hines Blvd., Dallas 1, Texas. The unit features wedge-shaped tamping feet which exert a 685-psi pressure. Empty, the Gebhard 22 weighs 21,450 pounds; loaded, 33,585 pounds. The Shovel Supply Co. will send you Form FM-220-A on mention of this report.

Truk-Loder Dumping dirt into hauling truck

HANDLES LOOSE DIRT QUICKLY

For highway construction and maintenance. Surplus berm and ditch dirt are quickly and economically loaded.

Hauling trucks can be loaded from either side or rear. Standard dump truck hoist furnishes lifting power. One-man operation. Bucket has ½-cu. yd. capacity. Write for prices and delivery.

TRUK-LODER COMPANY • Tiffin, Ohio

You've got to be GOOD to wear it!

• Like the Distinguished Service Cross, the AGC rating plate on a mixer or paver represents exceptionally meritorious service. For no mixer or paver can wear this symbol of quality unless it has earned the right. It is your assurance of guaranteed capacity and performance.

The AGC rating plate eliminates the guesswork about equipment. When you estimate a job, you know exactly what mixer and paver capacities are, right down to the last yard.

Why take a chance? Next time you buy, insist on equipment wearing the AGC rating plate. You'll find it pays!

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Affiliated with the Associated General Contractors of America, Inc.

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The Foote Co., Inc., Nunda, N.Y.
The Jaeger Machine Co., Columbus, Ohio
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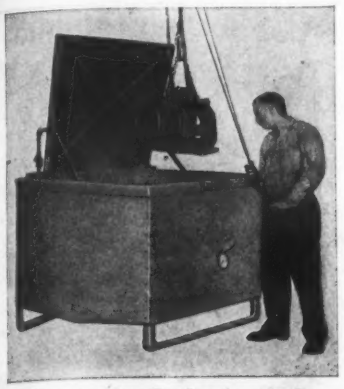


The new Aeroil cleaning tanks, available in two models, are designed for degreasing truck, tractor, and other large engine blocks.

Engine-Cleaning Tank Heated From Inside

Cleaning tanks designed for degreasing truck, tractor, and other large engine and motor blocks have been made available in two models by the Aeroil Products Co. Both are used in connection with the hot-dip alkali cleaning process.

The units are described as being fully insulated. They are heated from the inside by means of a patented removable immersion tube system, with the burner in a "well" within the insulated tank. Gas or kerosene is used for fuel. Thermostatic controls regulate the heat from 100 to 550 degrees F.

Standard equipment includes a built-in dial thermometer, removable grilles, a scum gutter, sludge drain, draw-off cock, and double-braced hinged covers. One model has a 270-gallon capacity and is made of 14-gage steel, 54 x 38 x 30 inches. The other, made of 12-gage, is 60 x 38 x 36 inches, and has a 355-gallon capacity.

Specifications, performance data, diagrams, and other details about these cleaning tanks will be mailed on request. Mention this notice when writing the Aeroil Products Co., 5701 Park Ave., West New York, N. J.

Asphalt, Old in Age, New in Usefulness

One of the most useful and widely obtainable waterproofing and cementing substances available to man, asphalt has been in use since 3,200 B. C., historians tell us. The ancients used this material for pavements, baths, irrigation systems, and the sealing of tombs. It still serves to cement some of their structures that have survived the ravages of time.

Derived from the naphthenic component of petroleum, asphalt originated in the dim years when the earth was young. Like coal and similar carbonic formations, it owes its birth to organic matter which was plowed under in some great upheaval of the infant earth. This vegetation underwent tremendous compression deep in the earth, forming coal, petroleum, and diamonds.

Some of these formations were pushed close to the earth's crust in later upheavals. A natural separation of the asphaltic elements from the lighter constituents of petroleum resulted in the outcroppings of asphalt which the ancients used. During the process, it frequently became more or less mixed with fine mineral matter. This "refined by nature" product is called natural asphalt.

Deposits of natural asphalt occur in scattered parts of the world, and are still in use. Such asphalt has varying consistencies, ranging from essentially pure hydrocarbons to low-grade sand asphalts that contain as little as 6 per cent asphalt. Some of these must be mixed with refined petroleum asphalt in order to obtain a product having a consistency suitable for commercial use.

Refined petroleum asphalts are obtained from selected crude oils under controlled refining processes. In this way varying grades of asphalt can be produced. Crude oils in the naphthenic family are distilled to remove the other petroleum products. The residue from this distillation is either "steam-reduced" asphalt or a product that must be treated still further, by oxidation, to produce what is known as "air-blown" asphalt.

Asphalts for special purposes are obtained in other ways: from the thermal cracking of gas oils to produce gasoline; and from the solvent refining of lubricating oils. Many refiners also supply various types of liquid asphalts prepared either by the addition of a solvent or by emulsification. Either of these processes provides a form of asphalt that can be used cold, unlike usual asphalt which always requires heating.

The wide versatility of asphalt is evidenced by the fact that as many as 6,000,000 tons are used annually in the United States. Half of this amount is used in road building and maintenance, and more than a quarter for roofing. Waterproofing, paints, rubber products, insulation, and a multitude of other purposes are also served by asphalt.

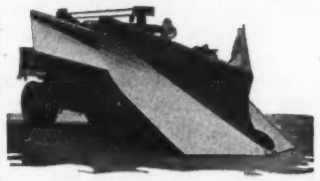
Readers who desire to learn more of the story of asphalt, past and present, can secure a copy of *Lubrication* for June, 1946, by writing direct to The Texas Co., 135 E. 42nd St., New York City 17, N. Y. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

Heads Excavator Sales

L. O. McLean has succeeded Don B. Smith as Sales Manager for the General Excavator Co., Marion, Ohio. Mr. McLean joined the firm in 1920. He was at one time Eastern Sales Manager for the Michigan Power Shovel Co., and has been a construction engineer, a contractor, a distributor, and is also an inventor.

It's TIME to CHECK and DOUBLE CHECK

DAVENPORT-FRINK SNO-PLOWS



ALL TYPES AND SIZES

—are in great demand. The increasing favor accorded to the FASTER ● SAFER ● CLEANER snow removal by these engineer-preferred Sno-Plows makes it good sense to check over your snow removal equipment NOW in preparation for next winter. A complete line. Write TODAY for Complete Information.

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Now In Production

AT OUR AURORA PLANT

Here they come—*packed full of new tool features*—the new Thor Portable Electric Saws!

Now in production in volume for delivery through Thor distributors everywhere, these new Thor Saws are available in 6", 7" and 8" blade sizes for all types of cutting in wood or metal.

See these new Thor Saw features for yourself *now*—call your nearby Thor distributor for a demonstration.

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Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

Dredge-Repair Base Is Fully Equipped

U. S. Engineer Shop Grew During War; Sent Parts Overseas; Now Does Heavy Repair for 15-Ton Dredges

✦ ONE of the best dredge-repair shops in the United States is located at Rio Vista, Calif., on the Sacramento River. It is owned and operated by the Sacramento Office of the U. S. Engineer Department. This well equipped yard keeps its own dredges in service and makes heavy parts for certain other machines no longer in the Sacramento District.

Back in 1913, the lower Sacramento River from the Rio Vista bridge to San Francisco Bay was a crooked shallow river, subject to high water and flood damage. Plans were finished that year to straighten the river by dredging, to widen and deepen its channel. A 30-foot deep-water channel was later dredged to Stockton.

The two dredges assigned to the District to do this work were the Sacramento and the San Joaquin. Both are hydraulic pipe-line rigs with steam engines, steam-driven pumps, and reciprocating steam engines on their cutter shafts. At that time they were considered the *ne plus ultra* in dredging equipment, and the Rio Vista yard was started to keep them supplied. It has grown through the years, as dredging intensified, until now its shops can easily make parts for 15-ton dredges.

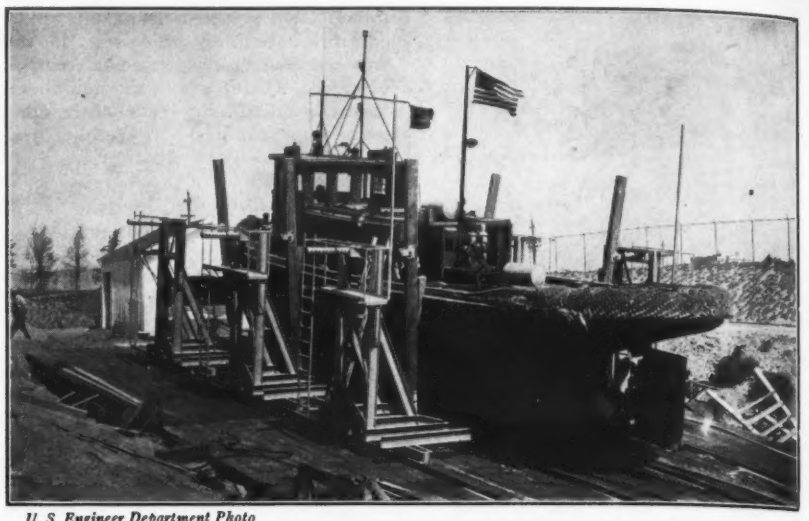
With talk of new dredging equipment capable of digging 135 feet deep in the new Panama Canal scheme, dredgemen are certain to be interested in the Rio Vista yard. It is going to take repair facilities beyond all previous comprehension to care for new hydraulic machines bigger than any yet produced. Possibly more than any other private repair facility for dredges in the country today, the Rio Vista establishment can point with pride to the installation of extremely large lathes, boring mills, and shapers—machines costing up to $30,000 apiece. In order to evaluate properly the growth of the Rio Vista yard, let us examine for a moment the Army dredging program behind it.

Maintenance Dredging

The Sacramento and San Joaquin Rivers meander along generally tortuous courses towards the sea. The Stockton deep-water channel can accommodate ships to 30 feet of draft. But it requires periodic maintenance. So does the channel through Suisun Bay. A new channel up to Suisun City is now contemplated. There are certain hydraulic properties of the waterways in the Sacramento District—properties that defy a clear explanation—which make fairly certain the localities in which maintenance dredging will be required from year to year. Nobody knows exactly why the rivers choose to drop their sediment in certain places. But everybody connected with the dredging program can tell you within 500 feet where the shoals will be the highest.

At any rate, about 2,000,000 cubic yards of silt wash down each year to hinder navigation. It has to be removed. Veteran dredgemen and Army Engineers get wise, after fighting the Sacramento and the San Joaquin for years, and they resort to tricks to whip the river. They dredged a big catch basin 45 feet deep at the mouth of the San Joaquin ahead of the place where shoaling usually occurred. The catch basin worked, but the shoaling area only filled up that much faster. The same amount of yardage was there, from year to year, to be removed. How-

(*Continued on next page*)

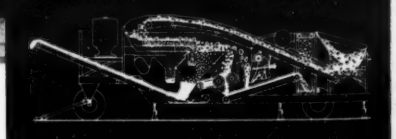


U. S. Engineer Department Photo
The Rio Vista, pulled up on the submarine railway at the Rio Vista, Calif., dredge-repair base, is now ready for repairs.

This may not be a record, but it's still darn good production with plenty of profit for the contractor. On some jobs, the Cedarapids Junior Tandem will turn out more tonnage and on others not as much because there are so many outside factors that affect production. However, on job after job, you can count on the Junior Tandem for higher capacity, easier operation, minimum maintenance and *low cost*.

Here are just a few of the reasons why: Horizontal vibrating screen assures greater capacity, closer grading and higher efficiency. 10″ x 24″ or 10″ x 36″ roller bearing jaw crusher and 24″ x 16″ roller bearing roll crusher provide plenty of crushing capacity for the toughest jobs. V-belts and universal drives eliminate troublesome chains and sprockets. Fast, easy set-up and take-down minimize lost time between jobs. Chip screen and sand eliminator can be used as desired. Choice of feeding methods to fit different loading conditions.

When buying a crushing plant—buy the best—buy Cedarapids. Get the details about the Junior Tandem from your nearest Cedarapids distributor. They're experts in solving aggregate producing and asphalt mixing problems.



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IOWA MANUFACTURING COMPANY
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HYDRAULIC HOSE ASSEMBLIES

The yardstick of dependable service is your trouble-free experience with ANCHOR pressure-proof hose assemblies on your hydraulically operated machinery. Factory applied to hose, the patented grip strengthening feature of the couplings is the ductile sleeve between coupling and hose. It virtually makes the coupling become a part of the steel re-enforcing wires of the hose.

For high pressure, medium pressure, or low pressure applications, hose is available from 3/16" I.D. to 1½" I.D. inclusive.

SEND US YOUR INQUIRY AND SPECIFICATIONS

ANCHOR COUPLING CO., INC.
342 N. Fourth Street, Libertyville, Illinois
FACTORY BRANCH
12393 Cleveland Ave., Detroit 4, Michigan

Dredge-Repair Base Is Fully Equipped

(*Continued from preceding page*)

ever, the catch basin gave the dredges a little more bank to work in, and that small advantage was well worth while.

You cannot import a hydraulic dredge on maintenance work, set its performance at say 750,000 yards a month, and go on cheerfully about your business. Maintenance dredges operate at times with extremely low output figures. They do so especially where the shoal is shallow and the machines have to travel long distances on their spuds. Neither can you narrow dredge types down to one. In a river system such as this, the Engineers use seagoing hopper dredges on some of the shoals, cutterhead pipe-line rigs on others, and clamshells if they will reach to a levee where they can dispose of their material. This means maintenance—much maintenance, and a variety of spare parts.

With the advent of war, the Sacramento and the San Joaquin dredges moved overseas. They worked at Midway, Guam, and Okinawa. All their spare parts had to come from the shop that had kept them supplied in the past. There were claims to the contrary from Naval supply officers in the 301st U. S. Naval Construction Battalion — with which the writer happens to be ruefully familiar! Nevertheless, the spare cutter shafts, gears, steam pistons, and other parts were all turned out in the Rio Vista shop under an emergency set-up.

The country's large machine shops, with engine lathes and shapers capable of machining huge castings, were all flooded with Navy and other emergency war work. No longer was it possible to let contracts for finished parts. So the Sacramento District found itself in the position of having to set up in the dredge-repair business in a large way. It decided to do so after it had appraised the situation carefully. And it decided that the maintenance program after the war would justify the type of elaborate outlay that was necessary to meet the overseas commitments at that time.

The number of employees in the Rio Vista yard was increased to about 120. Improvements in the shops were made. The 16-acre plot of ground swarmed with stored dredge parts, a welding shop, machine shop, blacksmith shop, carpenter shop, and a marine railway where small boats and tugs were pulled and repaired.

Repair Facilities

The nucleus of the Rio Vista yard is its machine shop. There big castings come from the foundries in Stockton or San Francisco, to be turned down to fine measurements. The flanges for dredge pipe lines are turned and bolt holes drilled there. When the shop was visited for CONTRACTORS AND ENGINEERS MONTHLY, a number of 6-inch core recovery barrels were being made to speed up exploration work on several dam sites now approved.

The machine shop is staffed with mechanics with the skill of Shop Foreman P. O. Berg, or "Old Man" Petersen, a machinist who worked for Union Iron Works before coming there. Petersen took a rough casting and bored the hydraulic cylinder for a 600-ton press. Then he did all the finishing machine work to make it a success. That, he said, was his hardest job, until Berg asked, "No, no, Pete, how about the time we ran the 10-ton piece through the old 4-ton shaper?"

The large lathes and other machines purchased during the war are now in place, and at present the machine shop has this equipment available and working:

1 shop-made 600-ton hydraulic press
1 Nye No. 200 pipe threader, ¼ to 2½-inch
1 Johnson metal-cutting band saw
1 LeBlond 48-inch heavy-duty engine lather, 25½ feet between centers
1 heavy-duty planer
1 Universal boring machine
2 Smith & Mills 25-inch shapers
1 Lodge & Shipley 28-inch engine lathe
1 LeBlond 18-inch lathe
1 American 18-inch lathe
1 Wickes 48-inch engine lathe
1 No. 4 Cincinnati milling machine
1 Merrill key-seating machine
1 boring machine
1 Cincinnati shaper
1 Niles radial drill
1 P&H 15-ton overhead power-driven crane
1 Giddings & Lewis No. 0 boring machine

(*Concluded on next page*)

C. & E. M. Photo

At the Rio Vista dredge-repair shop, Shop Foreman Berg, in the foreground, examines the caliper section of the storeroom. Note the arrangement of the steel drill bits.

Vulcan Tools

A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

Vulcan Tool Manufacturing Co.
35-43 Liberty Street, Quincy, Mass.
Branch Offices and Warehouse Stocks:
74 Murray St. New York, N. Y.
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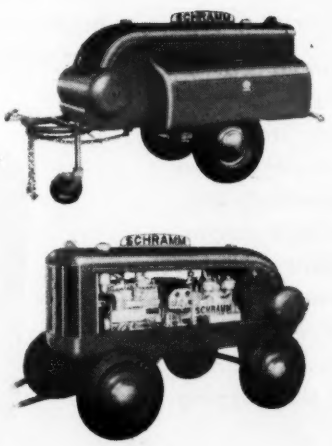


WHERE YOUR VERSATILE AIR COMPRESSOR COMES FROM!

The big Schramm Plant, with greatly increased facilities, furnishes air compressors to all industries. That represents thousands of Schramm Compressors, portable and stationary, now being used for every type of compressed air job.

Illustrated are two Schramm models. These units . . . as all Schramm Compressors . . . are lightweight, compact, rugged. They contain such features as 100% watercooled, mechanical intake valve, forced feed lubrication.

Schramm Compressors are modern to meet modern needs. Facilities, workmanship, knowledge, all go into the manufacturing of each Schramm, and it is for these reasons you get real savings when you use a Schramm Air Compressor.

For complete details, write us today.

SCHRAMM INC.

Dredge-Repair Base Is Fully Equipped

(*Continued from preceding page*)

1 Greaves 14-inch lathe
1 Atlas drill
1 Fraser grinding machine
1 heavy-duty power hacksaw
1 Canedy-Otto drill
1 Delta post drill
1 Lempco grinder
1 Chicago riveting machine
1 Superior hand chain hoist
Bench vises and power grinders at each lathe

This shop has turned out some difficult work with speed and efficiency. Some double English threads were formed on a cutter shaft, sent out to the dredge, and they worked.

The electric welding shop is also fully equipped with Lincoln and P&H arc machines. The latest and best welding technique is used, and many metal structural members are now welded.

The blacksmith shop is equipped to do a variety of necessary work. Equipment in this shop consists of the following:

1 trip hammer
1 Buffalo forge
1 Hendley & Wittemore punch and shear
1 bench bender, made of an old steam cylinder, air-operated through a 4-way valve
1 hot cut
1 punch and shear
1 Manning, Maxwell & Moore thread cutter
1 Acme thread cutter
1 Armstrong-Blum hacksaw

Other facilities in the yard include a fully equipped carpenter shop. It can repair dredge hulls, towboats, and do all types of finished ship carpentry. Light-gage tin can be bent there. The carpenter shop also has its own ways to pull small boats out of the water and bring them right up in the shop, where they can be repaired in a hurry.

The Rio Vista yard is in constant communication with its own dredges, with contractor's dredges which sometimes take maintenance work by contract, and with the Army District Engineer Office at Sacramento. All communication on routine matters is by radio.

Now that larger dredging projects are in the offing and the Panama sea-level canal almost a certainty, dredge contractors may wish to examine the merits of a shop of this type, from the standpoint of economy.

Personnel

Colonel Lester F. Rhodes is the District Engineer at Sacramento, with R. H. Hart and J. R. Morton, civilian engineers in charge of dredging. Ed Jensen is in charge of the Rio Vista yard, the 300-foot river channel from Rio Vista to the mouth of the Sacramento, and the Stockton deep-water channel together with interconnecting waterways.

C. & E. M. Photo

Well planned layout and orderliness make for efficiency in any machine shop. They are exemplified in the shop at the U.S.E.D. dredge-repair base at Rio Vista, Calif.

New Light-Control "Eye" for Highways

A new photoelectric light control has been developed by the Fisher-Pierce Co. The device can be used to control highway lighting, beacons, signs, underpass lighting, and similar installations. It is designed to avoid duplicate power networks for new lighting, and to permit simple extension or conversion of series networks already existing.

Mounted on the distribution pole, the control is wired to the distribution systems and to the lights to be controlled. It will control up to 500 watts of incandescent-lamp load directly. The unit consumes 6 to 7 watts, and is built with plug-in construction. It will not be affected operationally or physically by wide temperature extremes, the manufacturer says.

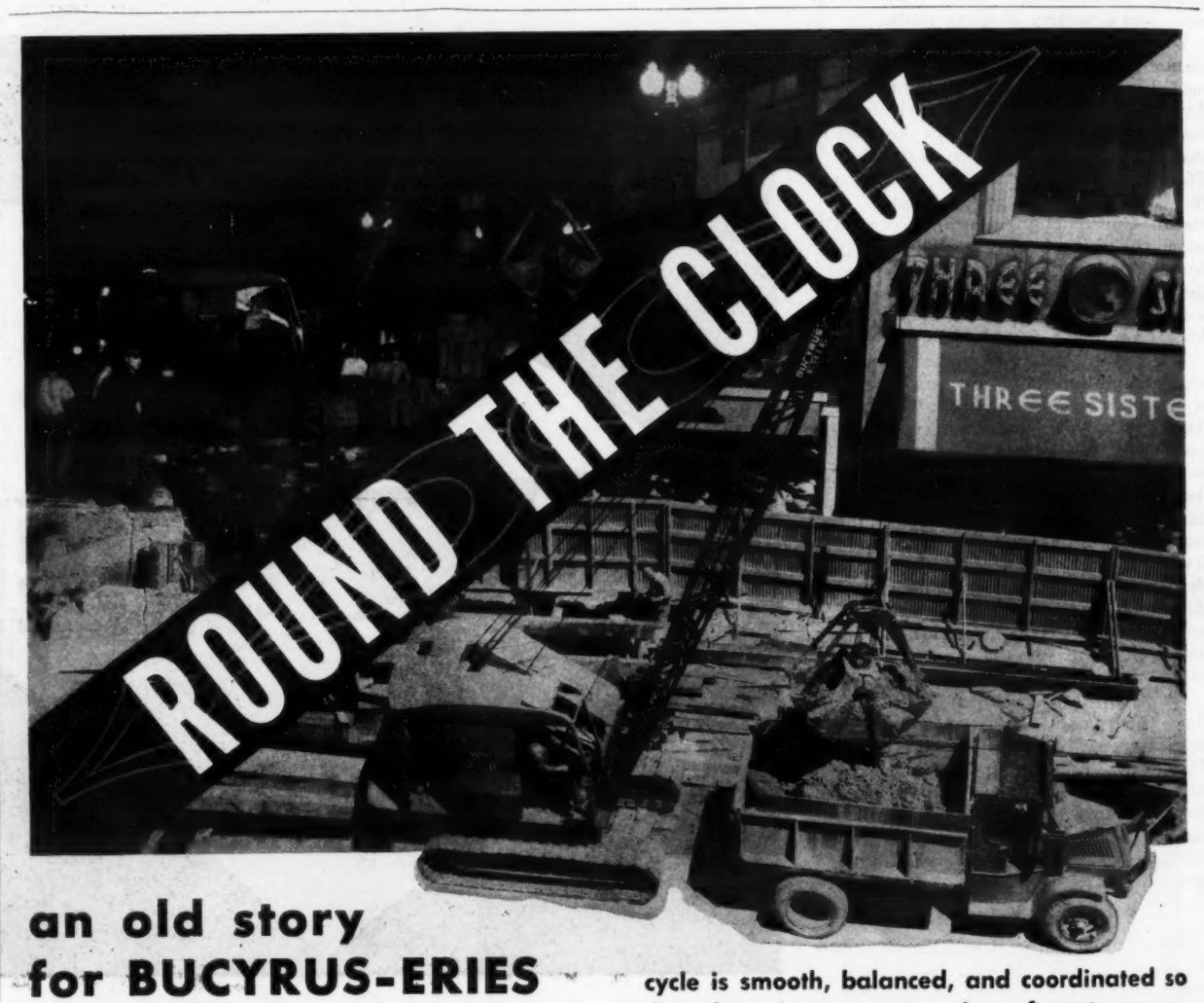
With the new control, north-sky illumination of any pre-set value from ½ to 6 foot-candles will turn the lights on. They go off again when 2 foot-candles more than the turn-off point is reached. A delay of 15 seconds prevents the control from being turned off at night by lightning or by lights from passing automobiles. The unit functions over a range of 105 to 130 volts, 50 to 60 cycles with no change in operating levels.

Full details, with an analysis of the economic and technical advantages of multiple highway lighting controlled in this fashion, are given in a bulletin FP-61300, available on mention of this notice. Write the Fisher-Pierce Co., 82 Ceylon St., Boston 21, Mass.

Drill Catalog Offered

A wide line of rock drills and companion equipment is featured in a catalog available from the Cleveland Rock Drill Division of the Cleveland Pneumatic Tool Co. The 154-page illustrated volume gives complete data on Cleveland sinker drills, paving breakers, clay diggers and tampers, drifters, stopers, wagon drills, riveters, chippers, scalers, calking tools, sand rammers, air drills, rotary grinders, and sump pumps.

Copies of Catalog 42R can be obtained by dropping a card to the Cleveland Rock Drill Division, 3781 E. 77th St., Cleveland 5, Ohio. Mention this notice.



an old story for BUCYRUS-ERIES

THE ABILITY of Bucyrus-Erie ⅜- to 2½-yard excavators to deliver a higher percentage of working time every day is one of the big reasons why they've proved their output superiority on every type of excavating job.

In their design the most careful consideration has been given to features that eliminate or reduce delays: adjustments that "stay put" are easy to make; machinery is arranged so that repairs, replacements, lubrication, etc., can be handled quickly; parts are kept simple, large, few in number — there is little that can go wrong; *all* operating control levers are conveniently grouped so that the operator can stay at his position and are easily manipulated to reduce operator fatigue; the digging cycle is smooth, balanced, and coordinated so that there is no overstressing of parts or excessive wear.

These and other Bucyrus-Erie features let you tackle a regular diet of day-and-night jobs with every assurance that you'll get a higher percentage of actual working time — and output — each shift.

you make the most of EVERY HOUR with a BUCYRUS-ERIE

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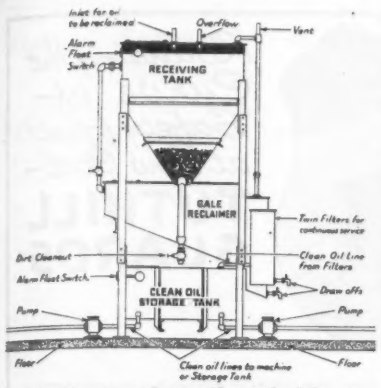


This diagram shows the principle on which the Gale oil reclaimer operates. The units are available in a range of sizes for a variety of requirements.

Engine Oil Purified, Reclaimed for Use

Lubricating oil can be cleaned and recovered at the rate of 2 gallons per minute with its small oil-reclamation system, the Gale Oil Separator Co. states. This small unit can be used in state and county highway department depots, as well as in contractors' garages.

Easily installed and simple to operate, this reclamation set-up de-sludges and clarifies dirty oil completely so that it can be used over and over again, Gale says. It operates by gravity. Dirty oil flows from a tank into the Gale separator, where the heavy dirt, metal particles, and carbon are removed. The lightened oil then passes through a filter which removes the smaller particles of carbon and residue. Thoroughly cleaned, the oil travels to a storage drum for further use. It can be returned to the truck or tractor engine immediately.

Maintenance men can secure further details on Gale oil-reclamation systems by writing the Gale Oil Separator Co., Inc., 52 Vanderbilt Ave., New York 17, N.Y. Say you saw it in CONTRACTORS AND ENGINEERS MONTHLY.

Impact Air Wrench Has New Principle

A new Thor pneumatic impact wrench, said to be the smallest and lightest ever developed in its class, has been put into production by the Independent Pneumatic Tool Co. This new tool drives and removes nuts, bolts, and cap screws up to ⅜-inch thread size. It is the forerunner of a completely new line of Thor impact tools, which will soon be available in capacities of ¼, ⅝, ¾, and 1¼ inches.

The wrench introduces a new theory of impact mechanism, the manufacturer states. Rotatively-striking impact jaws are set at a wide radius from the spindle center to reduce stress; a short, rigid spindle shank delivers the blow close to the work. Streamlined housing gives comfortable one-hand operation, with greatly reduced torque reaction, it is said. The wrench weighs 3¾ pounds and is 5⅞ inches long.

Circular 565 describes this new impact wrench, and is yours for the asking. Mention this news item when writing the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.

Vertical Boilers Shown

Full-length and submerged fire-tube boilers of the vertical type, made by The Brownell Co., are described in a new specification sheet just issued. The boilers range in capacity from 3 to 110 hp, and can be fired mechanically or by hand. They are used on various construction jobs, on dredges, derricks, pile drivers, and the like.

The illustrated folder, Bulletin B-3, can be obtained on mention of this notice. Just write The Brownell Co., 424 N. Findlay St., Dayton 1, Ohio.

Book Discusses Legal Phases of Contracts

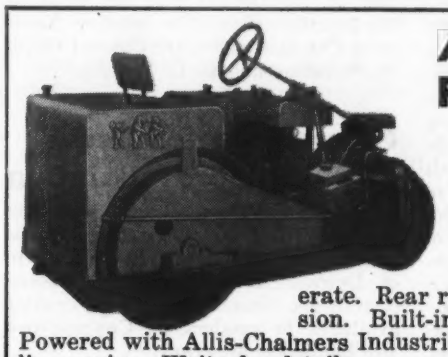
In the highly complex industry of modern contracting, the specifying engineer or the contractor often finds himself faced with the question, "What are my legal rights?"

To help him understand more fully some of the common legal problems that arise, "Legal Phases of Construction Contracts" has been published by the McGraw-Hill Book Co. The work has been compiled by I. Vernon Werbin, who is both lawyer and civil engineer.

Written from the engineer's viewpoint, in non-legal language, the book discusses forty-six different legal problems of practical interest. It shows the court precedents that have been established on these issues. In many cases, it gives the actual language of the contract provisions and the facts involved, so that the reader will more readily understand the import of the court's decision.

An index and a table of the cases cited supplement the 240 pages of text. The author warns, however, that there is no substitute for professional advice, and urges that the contractor seek such advice rather than try to be "his own shoemaker".

Copies of "Legal Phases of Construction Contracts" can be obtained through CONTRACTORS AND ENGINEERS MONTHLY Book Service. The price is $2.75.



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Pierce-Bear 3½-5 Tons Variable Weights

Engineered for economical operation where the going is tough. Compact, easy to operate. Rear roller gives heavy duty compression. Built-in water tanks for wet rolling. Powered with Allis-Chalmers Industrial Heavy-duty Model "B" gasoline engine. Write for details.

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Then, put this ONE-MAN MAINTENANCE CREW to work the moment you can get your hands on one. Keep in touch with your local dealer.

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8 Rotary Broom

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ALSO 3 WHEEL AND TANDEM ROLLERS

Massachusetts Has New Commissioner

The Massachusetts Department of Public Works is now headed by Joseph F. Cairnes of Boston, who was appointed Commissioner by Governor Maurice J. Tobin. Although only 39, the new Commissioner has had extended experience in the construction field, having worked for eighteen years in various capacities on engineering projects. He spent six years in bridge and structural-steel construction with the Edward J. Cairnes Co. of which his late father was President. In 1934 he took a position with the Federal Public Works Administration. He became Inspector and Resident Engineer on such large projects as the General Edwards Bridge at Revere, Mass.; the Wellington Bridge over the Mystic River at Somerville, Mass.; and also on the $4,000,000 North Metropolitan sewer system for Greater Boston. He transferred in 1938 to the Regional Director's Office of the PWA in New York City; he spent a year there on plans for various projects in the New England area.

In 1939 he became Project Engineer for the Metropolitan District Water Supply Commission of Boston on the construction of the Quabbin Reservoir and the 18-mile aqueduct. On this work he represented the PWA, which contributed $16,000,000 to it. Mr. Cairnes became Regional Engineer for the Federal Works Agency in June 1941. In that capacity he supervised projects in the six New England states as well as New York, Pennsylvania, and New Jersey.

He resigned in August, 1944, to take a position as Principal Engineer with Thompson & Lichtner Co., Inc., eastern consulting engineers who were making studies at the East Boston Airport. In November, 1945, Governor Tobin chose Mr. Cairnes as his special representative to expedite construction at the big airfield. In January of this year he appointed him to the post of Associate Commissioner in the State Department of Public Works. In May, Mr. Cairnes became Commissioner, succeeding Herman A. MacDonald who has resumed the practice of law. The two new Associate Commissioners are Colonel Ralph A. Palladino and G. G. Hyland.

Compounds for Use In Spray Painting

Two products applicable to spray painting in highway department shops are being marketed by the Detrex Corp. of Detroit. These spray-booth compounds are discussed in a new booklet available to readers of CONTRACTORS AND ENGINEERS MONTHLY.

One Detrex product, Triad WSF, is a conditioner for use in the water of wet spray booths. It is designed to prevent the fouling or clogging of lines, pumps, nozzles, and other vital working parts by accumulated paint overspray.

Triad PR, a recently announced Detrex product, is a protective coating for the side walls of spray booths. It is said to provide a light-reflecting finish that can withstand mild abrasion. PR has a brilliant white surface for improved visibility, and can be flushed off with water or steam, Detrex says.

The new Detrex booklet on Triad spray compounds can be obtained by writing the firm at P. O. Box 501, Detroit 32, Mich.

Heads Virginia RBA

S. J. Mahaffey has become Executive Secretary of the Virginia Road Builders' Association, following the resignation of A. J. Rayner. Mr. Mahaffey is former Manager of the City of Durham, N.C., and of Henrico County, Va.

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If you have a Vibrator problem, by all means let us show you how to solve it to best advantage. Drop us a line. No obligation, of course.

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

Revised, Enlarged, Free Soil-Stabilization Book

Soil stabilization, always an important consideration for the road builder, is discussed in an 85-page booklet issued by Seaman Motors, manufacturer of the Pulvi-Mixer. First published in 1942, the booklet has been revised and enlarged for this, the ninth edition.

Titled "Soil Stabilization Methods", this work discusses many aspects of soil-stabilization theory and technique. Its procedures are outlined for use in new construction, reconstruction, shoulder surfacing, and base and surface courses. Stabilization through soil-cement methods, bitumens, and chemicals is considered.

Copies of Bulletin E-26 can be secured from Seaman Motors, 305 No. 25th St., Milwaukee 3, Wis.

U.S. Steel Men Retire; McDanel in Paddock Post

Retirements have effected changes in the top management of two U. S. Steel Corp. subsidiaries, the American Bridge Co. and the Virginia Bridge Co. Leon A. Paddock, President of both units and a Director of U. S. Steel, has been succeeded by Frank K. McDanel, a Director of American Bridge Co. and its Vice President in charge of manufacturing.

At the same time, Eugene H. Heald, an American Bridge Co. Director and Vice President in charge of sales, has relinquished his duties to Norman B. Obbard, wartime Manager of the firm's Ambridge, Pa., shipyard.

Mr. McDanel has been succeeded by Austin J. Paddock, former Manager of the American Bridge plant at Gary, Ind. William A. Thiel has replaced A. J. Paddock at Gary.

McGraw Takes to the Air; —Contracting on Wings

Wings to keep up with the construction boom—that is the policy of F. H. McGraw & Co. The firm recently purchased a twin-engine Beechcraft transport to help it supervise and direct its far-flung construction activities.

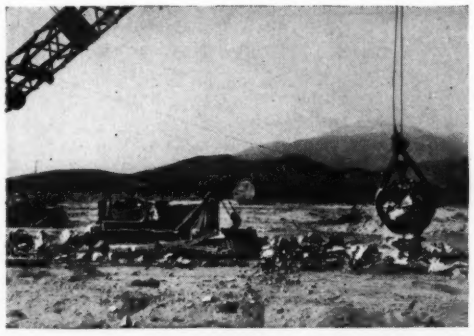
Not only will the plane be used for emergency transportation of critical small parts. It will also serve to bind more closely the activities of the firm's branch offices in the U. S., and in Central and South America, with the home office at Hartford, Conn.

ALL THE WAY WITH "CATERPILLAR" DIESELS

Keen, business-minded contractors don't risk repeated purchases of costly equipment that can't show evidence of long-lived performance and dependability. It is on that sound basis that the seven important phases of the Lytle Creek (California) Flood Control Project pictured here overwhelmingly featured "Caterpillar" Diesel equipment. Note the number of units "zoned" to the various jobs.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

1. Seven Diesel Tractors operating scrapers.

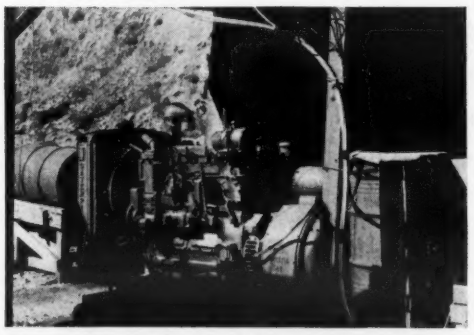


2. One Diesel Tractor bunching rock with rock rake.

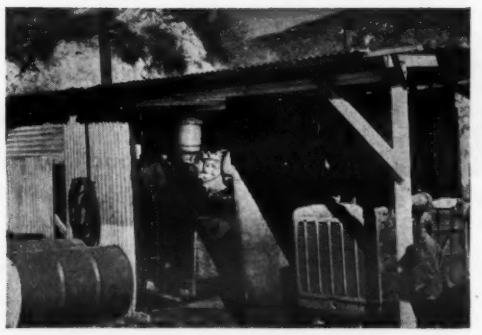
3. One Diesel Engine powering shovel.

4. Two Diesel Tractors grading levees.

5. Two Diesel Tractors bulldozing rock for rip-rap.



6. One Diesel Electric Set supplying power for repair shop, quarry lights and gas pumps.



7. Two Diesel Engines operating compressors.

CATERPILLAR DIESEL

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ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

—for lowest costs on earth

Runway Paving

(*Continued from page 1*)

December 11, 1945, was staring the contractor's Superintendent in the face. H. R. Foster stared right back and managed to move about 4,500 cubic yards per day. But the contract time ran slightly over the scheduled completion date.

The subgrade under concrete taxiways or under the main runway was rolled by sheepsfoot rollers with 7-inch tamping feet. The CAA maintained a laboratory on the job, and technicians checked the degree of compaction by sampling compacted density about every 125 feet. They used a modified form of the Proctor method of density control, and required not less than 95 per cent of optimum laboratory density under pavement and 90 per cent on graded areas. Density tests were run on closer centers if it was required, but for the most part the fills on the Denton airport were uniform and shallow.

After the subgrade was acceptable, a 6-inch blanket of pervious gravel was placed and compacted. This material, involving some 18,000 cubic yards at $1.50 per yard, was hauled in by trucks from a pit about 4 miles distant. It was dumped by a spotter on centers calculated to guarantee the 6-inch depth of selected subgrade.

After this material was leveled by a LeTourneau bulldozer mounted on a Caterpillar D8, it was dressed by an Allis-Chalmers Model AD motor grader. The subgrade was then compacted by sheepsfoot, pneumatic-tire, and flat-wheel smooth rollers. The subgrade was checked every 10 feet with a string line stretched between blue-tops, and left about ½ inch high.

Other items in connection with grading in the Farrell contract included some 9,000 linear feet of corrugated-metal pipe drains from 18 to 42 inches in diameter; 3,000 linear feet of open-joint French drain with a coarse-sand backfill; 7,000 cubic yards of open-ditch excavation; 1,800 linear feet of electric-duct raceway; 1 wind cone and 55 boundary markers. A total of 1,200 rods of fencing was subcontracted by R. P. Avery of Denton.

Seeding the tract outside of runway lines was also included in the Farrell contract. This part of the landscaping was done in the spring. A mixture of 10 pounds of Bermuda-grass seed, 1 pound of sand dropseed, and 4 pounds of sideoats grama was sown per acre, to a depth of an inch.

Earth work and subgrade had been sufficiently completed by September 26, 1945, that an extensive area was ready for paving.

Concrete Paving

The Austin Road Co. contract included 52,500 square yards of concrete paving 7 inches thick at a bid price of $1.83, and 47,304 square yards of concrete paving 8 inches thick at $1.98. The thicker slab was placed for 500 feet at each end of the main runway, and in the taxiways, where the full weight of planes would rest. Work began on concrete paving on November 8, 1945, and was completed early in 1946.

This contractor developed a dowel-setting device which will be described later. It did away completely with chairs or other conventional types of supports. Paving was carried forward in the following step-by-step manner:

Fine-Grading of Subgrade

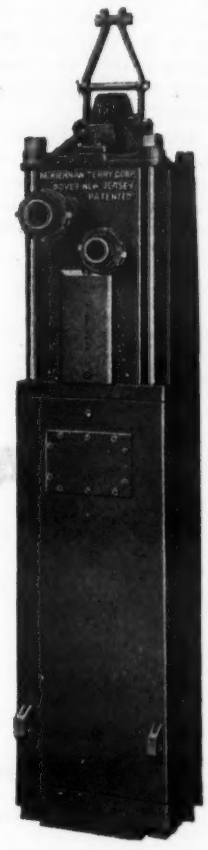
Runway and taxiway slabs were laid off by a survey party in 25-foot-wide strips. The contractor had about 5,000 linear feet of Blaw-Knox steel forms

(*Continued on next page*)

McKiernan-Terry only

SINGLE-ACTING PILE HAMMERS THAT WILL OPERATE UNDER WATER

These advanced single-acting hammers are now available in five standard sizes, with a striking energy range from 9,000 to 37,500 ft. lbs. per blow, delivered at a low striking velocity. This makes McKiernan-Terry Single-Acting Hammers the contractor's wise choice for use in penetrating dense substances — stiff blue clay, heavy "gumbo," incipient shale, hard pan, etc. Also for handling heavy mass piles, such as pre-formed concrete, without excessive strain on piling or wear on ram and anvil block.



Write for Full Information

McKiernan-Terry Bulletin No. 57 gives diagrams, specifications, operating notes, etc. Copy sent free on request.

MK-1005

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THE VERSATILE *AUTOMATIC* BUCKET

From coral reefs to excavating basements, the Page *Automatic* bucket has long met with success. Our capable engineers design every *Automatic* for the specific requirements of each job. From gold to sand, the *Automatic* will faithfully dig right in and come up with a full pay load in a minimum of time and effort.

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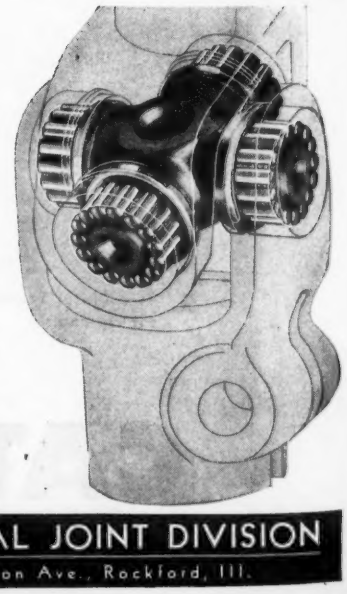

Let our engineers show you how the precision, durability and freedom from servicing requirements that are built into MECHANICS Roller Bearing UNIVERSAL JOINTS will help you give your products competitive advantages.

MECHANICS UNIVERSAL JOINT DIVISION

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BUY *all the Bonds you can . . .* **KEEP** *all the Bonds you buy*

Runway Paving

(*Continued from preceding page*)

available on this job, and kept them set at least 1,000 feet ahead of paving operations. The edge of the form was located by survey hubs, and a string line was stretched to guide a Cleveland formgrader. This machine traveled along the string line, excavating the subgrade to the required base elevation. The Cleveland formgrader prepared approximately 200 linear feet of form trench per operating hour.

From five to seven men were used to set and stake the Blaw-Knox steel forms. These were latched together by the patented fastening peculiar to them. They were oiled by means of a spray gun. Hand tamping was done around the base of the forms since power tampers in this material would only move the forms.

After the forms had been set in place, a fine-grader was drawn over the surface by an Allis-Chalmers Model L tractor. This fine-grader, weighing 3,500 pounds, was built on steel wheels to roll along the steel forms. Its cutting blade was raised or lowered by means of an eccentric-actuated gear. The cutting edge was made of discarded scraper cutting edges welded together to form one continuous blade about 24 feet wide. The contrivance was drawn along inside the steel forms until the subgrade elevation checked to the ½-inch tolerance mentioned earlier. Excess gravel or other material produced by this operation was carried on ahead and bladed off to one side by a motor grader, which backed down between the forms to pick up a load. The Allis-Chalmers motor grader and an Adams machine were both used, as a matter of fact, just ahead of the fine-grader.

After this operation was finished, the subgrade was rolled with a smooth roller. The forms were then rechecked for line and grade. The subgrade was checked for proper elevation by means of a string line stretched between forms.

Provision had been made in the airport design for a longitudinal joint on each 25-foot slab. This key-type joint, which was spaced halfway through the pavement, was formed by lumber bolted on the side of the Blaw-Knox forms. The joint was built one-third the depth of the pavement, and centered so that one-third the pavement depth would be above and one-third below it. The joint was strengthened by ⅝-inch deformed tie bars 30 inches in length, which were placed on 30-inch centers.

Expansion joints were placed transversely on 50-foot centers in each slab. They were made of ¾-inch redwood lumber, supported on Star lugs every 22 inches. The top of the redwood was placed an inch below the top of the concrete. In order to hold the top of the redwood on line, a special sheet-steel cap secured by six steel pins was made. This cap fitted over the top of the redwood in the center of the joint, making it possible to use two boards in forming this joint. All expansion joints going into a pour were, of course, placed ahead of concrete-pouring operations.

When these steps in the work had all been finished, and after a supply of dowel bars for the forming of transverse dummy contraction joints had been brought to the job, concrete pouring commenced.

Concrete Placing and Batching

Concrete for runway and taxiway paving was all a Class A mix, designed for a workability factor of 78 on a water-cement ratio of 7¼ gallons per sack. The cement content was 4½ sacks per cubic yard. A batch which yielded 40.8 cubic feet was worked out, and mixed in a 34-cubic-foot paver by overloading the machine. A typical batch of concrete at the scales was:

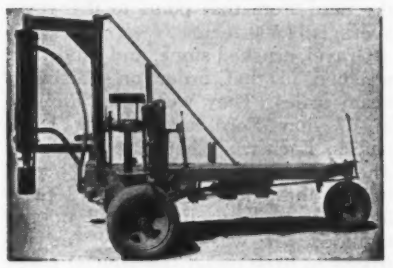
	Weight		
Aggregate	3,308 + 23	3,331	(Water 0.7 per cent)
Sand	1,939 + 87	2,026	(Water 4.5 per cent)
Cement		639	

Bank-run gravel and crushed stone were hauled in railroad cars from Lewisville and Brownwood, Texas. These materials were composed of silica and limestone. During the early part of the project, bank-run gravel was used exclusively. But towards the end when that material became scarce, about 50 per cent by weight of crushed rock was used. These aggregates were unloaded at the railroad siding at Denton by a 1-yard Northwest crane with a Williams clamshell on a 45-foot boom into a fleet of 10 Ford, Dodge, and Chevrolet 1½-ton dump trucks. These trucks hauled the material out to the airport and dumped it alongside a Heltzel 100-ton batch plant. The plant had three Blaw-Knox bins, each of 33⅓-ton capacity. A Northwest 1-yard clamshell was used to rehandle the aggregate from the ground to the bins. In all, it was neces-

(*Continued on next page*)

Junior CONCRETE RAPID PAVEMENT BREAKER

Fastest Pneumatic Method
Cuts Cost and Time
Works Inside or Out
Good for all Small Jobs



Ask about our HEAVY-DUTY TYPE
RAPID PAVEMENT BREAKER CO. 1917 Santa Fe Avenue Los Angeles 21, Calif.

INTERNATIONAL TracTracTors
Provide effective traction
for MAXIMUM POWER

You just can't beat the performance of an International Diesel TracTracTor wherever the going is tough. On soft footing such as loose sand, wet clay, boggy ground or mud, it drives on and pulls its load through as no other type of tractor can do. This ability to take hold and convert power into pull, regardless of footing, yields profits. More work is packed into each hour otherwise wasted in idleness or expensive maneuvering.

Beyond this immediate benefit is the long-range money-satisfaction of International's unbeatable operating economy. For example, the advanced-design fuel injection and combustion system of International Diesels extract the last ounce of power from fuel consumed. This keeps fuel costs down to bedrock, assures longer life for the engine. Sturdy construction and matchless service accessibility of every part of the tractor reduce maintenance to the minimum, avoid unnecessary and expensive down time.

Add to these the many other superior features of International TracTracTor design and operation—which the nearest International Industrial Power Distributor is prepared to explain and demonstrate. You'll agree that, for the tough jobs in earth-moving, construction, lifting, carrying and excavating, International Diesel Crawlers are unbeatable. They provide the kind of traction that takes hold, that assures maximum power at drawbar or 'dozer blade under every conceivable working condition.

You'll be ahead with International Diesel TracTracTors and matched equipment. Yes, you'll be ahead in lower-cost power and time-saving performance with equipment tailored to your operations. That's why it pays to standardize on International Tractors, Power Units and International-powered equipment. Look into the profit possibilities of their use on the jobs you're planning, now.

Industrial Power Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

Tune in "Harvest of Stars" Every Sunday NBC Network. See newspapers for time and station.

INTERNATIONAL Industrial Power

Runway Paving

(*Continued from preceding page*)

sary to move the material 5½ miles from the railroad siding to the bins, and the haul from that point to the paver averaged 1,500 feet.

Gravel, crushed stone, and sand were weighed in that order on Fairbanks beam scales. They were then dumped in 1½-ton Ford and Dodge batch trucks. Each truck hauled two batches. The Dallas paving contractor owned two of these trucks and rented three for $2.50 an hour, driver and upkeep included. It was necessary for the trucks to back under the Heltzel plant, because the big piles of aggregate obstructed a drive-through system.

Bulk cement was added on top of each batch at a Heltzel batching plant about 200 feet from the sand and aggregate. This plant, which was rated at a 200-barrel capacity, received Lone Star bulk portland cement by rail from Dallas. The cement was unloaded by a Butler Carscoop, hauled by trucks to the job, and hoisted into the storage bin by means of screw-auger conveyors. It was possible for the batch trucks to drive through under the cement batcher, take on their cargo which had been weighed on Kron beam scales, and be headed for the paver when that operation was finished.

The trucks end-dumped into the skip of a 34-E MultiFoote paver, which ordinarily was spotted on unfinished subgrade of an adjacent slab. Where it was necessary to spot the paver on top of concrete, timber grain doors were used for support and the concrete was required to be at least ten days old. The paver was equipped with a single-drum mixing chamber, a 30-foot horizontal boom, and a dual-gate bucket.

Mixing water was hauled in a 1,000-gallon water-tank truck from Hickory Creek near by. It was pumped into a 700-gallon trailer tank which the paver towed along as it moved forward. Water was added to the batch by means of a feed pump on the paver. It was proportioned on the basis of moisture tests the laboratory technicians had run on the aggregate-sand stockpiles. The concrete was mixed 60 seconds and dumped into the discharge bucket with an average slump factor of 2 inches.

Concrete was dumped on the 25-foot-wide strip in three equally spaced batches, starting from the side nearest the paver and continuing outward to the far side. Two Jackson vibrators—one powered by a Briggs & Stratton engine and the other by a Wisconsin engine—were used to consolidate the concrete. These were carried along with the paver. The average amount of concrete placed over the entire job was 275 batches per day. The record was 417 in 8½ hours. Each linear foot of 8-inch slab 25 feet wide contained 0.617 cubic yard of concrete.

Dowel Support

Transverse dummy contraction joints placed on 12½-foot centers were reinforced by 16 round dowel pins, ¾ inch in diameter and spaced on 18-inch centers. These dowel bars were not supported on chairs or pedestals and placed in advance of the pour in the conventional manner. But they were handled swiftly and with amazing accuracy by means of a little on-the-job machine developed by the contractor.

A channel-iron framework just wide enough to fit inside the side forms was built, with a series of sliding metal fingers spaced on 18-inch centers to coincide with the position of the dowel bars. Each end of this long sliding device fitted into a slot at each end of the frame. The device was rolled over on its back by two men; the dowels dropped in place and the sliding fingers closed. Spacer feet had been welded under the framework to hold the dowels 3½ inches up off the ground.

C. & E. M. Photo

This view of a concrete pour just ahead of a Jaeger-Lakewood finisher shows the frame for holding the dowels in place at contraction joints.

A very simple cable-controlled hoist, mounted on wheels which rolled along the forms, was rigged up out of spare pieces of junk to raise and handle the frame full of dowels. The two men hooked this hoist on to the frame and set it in place inside the pour just ahead of the paver. The dowel bars were painted with MC-1 cut-back asphalt and greased with cup grease before being placed in the frame.

The unusual feature about this contrivance was the fact that the whole thing, frame and all, stayed in place until after the concrete had been dumped and vibrated around the dowels. Then the hoist was wheeled back in position over the frame. Two hooks were fastened to lifting eyes, the sliding fingers were released in one move by a crowbar, and the frame was lifted clear of the concrete. It left all the dowels equally spaced and supported by the concrete of which now they were an integral part. The frame was then simply wheeled ahead to the next joint

(*Concluded on next page*)

NO dead weight!

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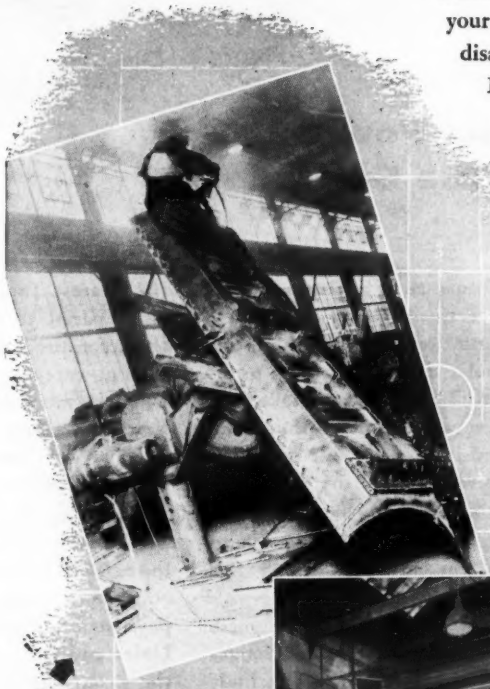
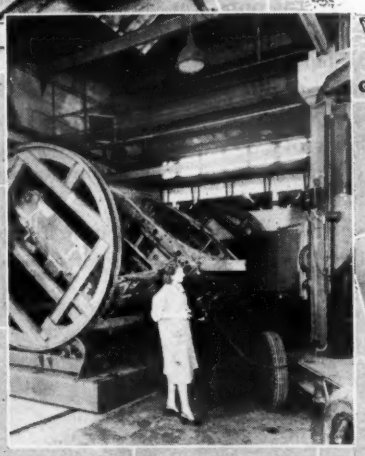
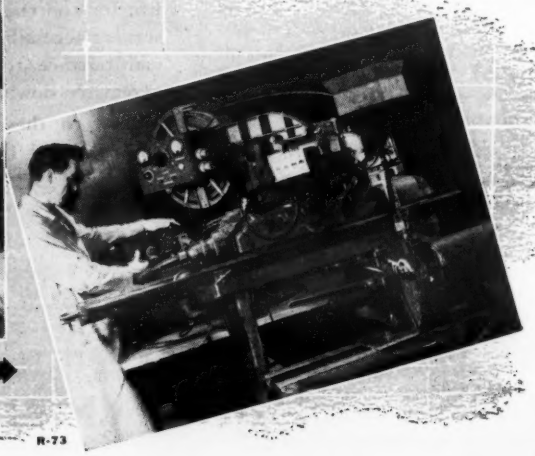
When you are moving dirt and rock, dead weight is like an anchor around your neck. Speed and load are reduced; schedules aren't met and profits disappear. • This problem led to progressive thinking by Heil engineers. New all-welded designs for bulldozers, trailbuilders, scrapers, and bottom dump wagons were created. Materials with an extremely high yield point were used. The results, of course, are lighter sections and much greater strength — dead weight is removed. The welded joints themselves are stronger than the parent metal — there are no rivets, nuts, or bolts to fail. • Definite proof that Heil's lighter but stronger designs reduce earthmoving costs is found in actual job performance reports from all parts of the country. They show that the greatly improved weight-to-power ratio enjoyed by Heil users means larger loads and faster trips. You, too, can easily enjoy the benefits of relentless research and the development of new processes and fabricating techniques. Use Heil earthmoving equipment.



Here you see a positioner. It places the object to be welded in any desired position. This permits "down hand" welding for higher quality. That is why Heil's welded joints are stronger than the parent metal.



Nothing is left to chance at Heil. This X-Ray machine spot checks welds and castings. Quality control such as this accounts for the sturdy dependability of Heil equipment.



Submerged-Arc welding is an example of the modern technique used at Heil. It eliminates the human element—every weld is identical. The improved quality made possible by this new method is one of the reasons why Heil equipment gives less trouble and lasts longer.

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

R-73

Runway Paving

(Continued from preceding page)

and the process repeated. This device speeded up pouring operations.

Finishing Concrete

As soon as the dowel frame had been lifted clear, a Jaeger-Lakewood double-screed finisher moved up on wheels to add more to the degree of consolidation of the mix, and to level the surface. Two "mud-cutters" were used with this machine instead of the conventional crew of three. The paver operator can take credit for this reduction. In his line he is more of an artist than is many a professional painter. He spaced his batches perfectly, dumping them with the bucket still in motion.

A center slot, running horizontally and spaced 12½ feet from each side of the slab, was next cut by means of a shop-built bridge with a steel tool. The transverse contraction joints were then formed by hammering ⅜-inch steel strips 25 feet wide and 1¾ inches deep into the concrete surface.

The surface was finished by two men who worked the slab from each side with aluminum bullfloats with 10-foot handles. They worked the concrete in a herringbone pattern. After the surface was dense, a rubber hose was dragged parallel with the long dimension of the slab. This created a modified herringbone finish which is considerably easier on airplane tires.

The joint edges were finished by four men, who used edgers with a ¼-inch radius. The edges adjacent to joints were also floated smooth and then brushed. As a rule these men worked from the bridge which cut the center joint.

The concrete was cured by using No. 40 curing compound at the rate of 1 gallon per 100 square feet. It was applied by hand-operated spray guns.

Testing Concrete

Test beams approximately 18 inches long by 6 inches square were made from each pour. These beams were stripped by laboratory men. They were cured for 7 days under the same conditions as the concrete which had been placed on the runways.

Quick, precise, and permanent records of the flexural strength of each beam were made by means of a Raines Series 415 beam breaker set up in the laboratory shack. This instrument, with the help of a Bristol recorder, measures the rate of load application so accurately that semiskilled operators can handle it. Flexural strengths were calculated right on the job at Denton in this manner, rather than by hauling beams all over the country.

After the concrete in the pours had set for 24 hours, the forms were stripped, cleaned by hoes, sprayed with form oil, and moved ahead to new pours. The concrete strips in the main runway were poured alternately, thus holding to the minimum the amount of paver time on top of concrete slabs.

Organization

In addition to H. R. Foster of the Farrell Co., who was previously mentioned,

C. & E. M. Photo

As the MultiFoote paver and Jaeger-Lakewood finisher approached the end of the forms in place on a particularly productive day at the Denton Airport, the concrete foreman ordered additional Blaw-Knox forms to be set.

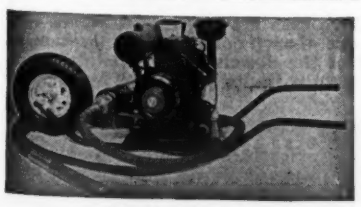
T. J. Insall was Superintendent for the Austin Road Co., Dallas, Texas.

The job was administered from the Fort Worth office of the Civil Aeronautics Administration, of which agency L. C. Elliott is Regional Manager. F. G. Tappan was the Resident Engineer on the job for the Civil Aeronautics Administration.

Orange Peel Buckets

Contractors, sand and gravel-plant operators, and highway engineers will be interested in a new bulletin issued by the Hayward Co. to describe its improved dwarf orange peel buckets. Designed for operation inside a 12-inch pipe and for digging wells and small drainage ditches, the dwarf makes significant economies possible, Hayward says.

The new literature contains illustrations that show typical applications of the bucket, as well as a chart of its capacities, weights, and dimensions. Write the Hayward Co., 32-36 Dey St., New York 7, N. Y., for a copy of Bulletin 804. Say you saw this notice.



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It will pay you to find out about the advantages of MICHIGAN Mobile SHOVEL-CRANES and how they can boost your income by keeping profitably busy *all* the time — on small jobs as well as large! Write today for complete information on these money-making shovel-cranes—ask for Bulletin CE-86.

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This new Dozer Loader, designed for use on most makes of trucks of 1½ tons or more, picks up a ⅔-yard load in front of the truck and delivers it to the truck body. Control is by means of a lever in the cab.

Dozer Loader Fits 1½-Ton Dump Trucks

Practically all makes of conventional or cab-over trucks of 1½ tons or more can accommodate the Dozer Loader being distributed by the J. C. Plummer Co. Controlled from one lever inside the cab, the attachment uses dump-body power take-off to lift as much as a ton. The 2/3-yard shovel may be used for leveling work by merely backing the truck with the shovel down. This Dozer Loader weighs about 2,200 pounds, and requires no changes in the dump body when installed.

Full details about the Dozer Loader can be obtained by readers of CONTRACTORS AND ENGINEERS MONTHLY who write to the firm at 14520 Albers St., Van Nuys, Calif. Mention this news item.

Silicate of Soda Finds Use as Soil Stabilizer

Silicate of soda shows great promise as a stabilizing agent for certain types of soils used in highway fills, earth dams, and similar structures, recent research indicates. This conclusion has been reached by W. Derby Laws and J. B. Page of Ohio State University on the basis of studies carried out under a grant from the Sodium Silicate Manufacturers' Institute.

It will not be possible to apply the chemical indiscriminately to all soil types, however, the scientists warn. Treatment should be applied only where soils have been adequately studied and evaluated, since some soils actually showed negative response.

The research was carried out in two parts: experiments with clay minerals, and experiments with soils. Pure clay minerals of the three major types—kaolinitic, illitic, and montmorillonitic—were used with various degrees of silicate-of-soda concentrates. Moist atmospheres were found to improve the properties of clay-silicate mixtures.

These clay mineral-silicate studies suggested that beneficial results could be expected from treating kaolinitic soils with the silicate; that favorable reaction might result from illitic material so treated; and that to treat montmorillonitic material thus would probably be detrimental to the stability of the soil.

Further studies with actual soil types, including silt loam, sandy loam, silty clay loam, and Cecil clay, tended to bear out these expectations. Observations showed that silicate concentrations of one per cent or more dissolved the organic matter of the soil. With alternate wetting and drying, this organic matter then moved to the surface and scaled off. Hence, if used for road-surface stabilization, silicate should be less than one per cent in concentration.

The full report of the Ohio investigators is given in "Bulletin No. 1" published by the Highway Research Board's Division of Engineering and Industrial Research. Copies can be obtained by addressing the Board at 2101 Constitution Ave., Washington 25, D.C. Price: 15 cents.

Worthington Appointments

The appointment of L. S. Riedel as Eastern Regional Manager, with offices at 748 Bruckner Blvd., Bronx, New York City, has been announced by the Construction Equipment Division, the Worthington Pump & Machinery Corp.

Worthington recently promoted the Chief Engineer of its Portable Compressor Division, Steven F. Evelyn, to the post of Consulting Engineer of Construction Equipment Products, with headquarters in Holyoke, Mass. He has been succeeded by Howard Platts.

New 2-Ton Hoist

A 2-ton model has been added to the line of Midget King electric hoists made by the Yale & Towne Mfg. Co. The unit supplements the ⅛, ¼, ½, and 1-ton sizes heretofore available. It can be purchased with a trolley for use on an overhead track.

The new Midget King is a lightweight, powerful, compact hoist powered by a 1-hp motor. Control is maintained through a bar-grip which necessitates only a flip of the wrist for lifting or lowering. A roller chain carries the load hook. Safety stops at the upper and lower safety limits prevent overtravel of the hook.

Because of its special steel construction, the hook will open slowly, without fracturing, before any other part of the hoist becomes strained to the yield point, Yale says. Alloy steel is used in the chain, gears, and shaft. Both brakes, all the wiring, and the controller are totally enclosed.

Complete details on the new 2-ton hoist are to be found in Catalog P-577, which readers of this magazine can obtain on mention of this notice. Write the Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24, Pa.

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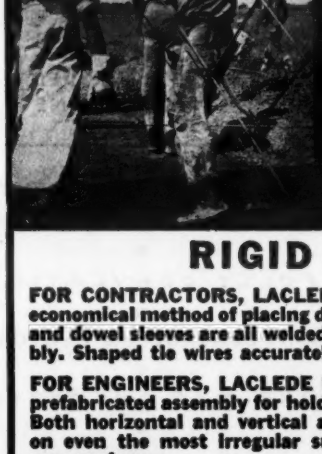
LACLEDE LACLEDE WELDED DOWEL SPACERS



RIGID – ACCURATE

FOR CONTRACTORS, LACLEDE DOWEL SPACERS provide a light weight, economical method of placing dowels and joints. Distribution bars, supports, and dowel sleeves are all welded into one integral unit for rapid joint assembly. Shaped tie wires accurately locate fibre or steel joint materials.

FOR ENGINEERS, LACLEDE DOWEL SPACERS provide a rigid, accurate, prefabricated assembly for holding each end of each dowel in exact location. Both horizontal and vertical alignment of the dowels can be maintained on even the most irregular subgrades within limits prescribed by highway engineers.

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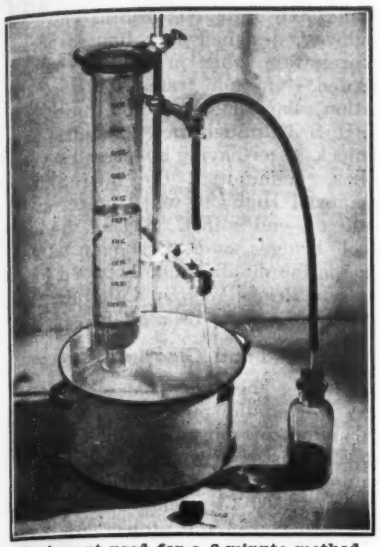

Equipment used for a 6-minute method of soil-moisture measurement is simple.

Soil Moisture Found In a Six-Minute Test

A six-minute method of measuring soil moisture has been developed by Herbert P. Pearson and Carl Bussow of New York City. The process is described as suitable for determining moisture of sand-silt and sand-clay in the field, eliminating the need for lengthy oven-heating methods. Mr. Pearson is associated with the Service Engineering Co., and Mr. Bussow with A. W. Dow, Inc.

The Pearson-Bussow method is based on the liberation of acetylene gas by the soil moisture, through reaction with an excess of pulverized calcium carbide. The experimenters claim that a variance of less than 0.2 per cent was found in duplicate determinations of the moisture content. The method is outlined as follows:

Apparatus: a 1,000-milliliter graduated cylinder that is stoppered; a U-tube; an 8-ounce wide-mouth glass bottle, fitted with a No. 5 rubber stopper which has a glass tube; a rubber hose to connect the two tubings; a No. 3 rubber stopper fitted with a short length of capillary tubing (this replaces the cylinder's glass stopper); a retort stand to support the cylinder and U-tube over a half-filled, 2-gallon water pan.

Procedure: Fill the cylinder with water; close with the No. 3 stopper to exclude air; invert the cylinder through the retort stand until its mouth is under water; withdraw the rubber stopper; place the cylinder's mouth over the U-tube so that the end of the tube rises above the shoulder of the cylinder. Place 20 grams of dry Ottawa sand in the bottle; add the weighed sample of soil; cover it with 30 grams of Ottawa sand; add 15 grams of finely pulverized calcium carbide.

Connect the bottle to the rubber tube attached to the U-tube; shake vigorously for 2 minutes; allow to stand for 3 minutes; shake again for 15 seconds. Note the level of the water; by this time the gas will have displaced water in the cylinder.

A total of 100 milliliters of the gas is equal to 0.18 gram of water. To estimate the percentage of water in the tested soil, use the following formula:

$$\text{Moisture per cent} = \frac{0.0018 \times \text{vol. of gas} \times 100}{\text{weight of sample} - (0.0018 \times \text{vol. of gas})}$$

For example, if a 10-gram sample produces 580 milliliters of gas, then:

$$\text{Moisture in dry soil} = \frac{0.0018 \times 580 \times 100}{10 - (0.0018 \times 580)} = 11.65 \text{ per cent}$$

Finely pulverized calcium carbide for this experiment can be obtained from The Alpha Lux Co., 155 John St., New York 7, N. Y. One pound will suffice for 20 to 30 tests. Ottawa sand (20 to 30 mesh) is a standard material at any chemical-supply house. Since 7 per cent of acetylene gas in the air is explosive, appropriate precautions should be taken throughout the test.

Further details on the equipment and procedure for soil-moisture tests may be secured from the Soilpak Division, Service Engineering Co., 360-68 Springfield Ave., P.O. Box 682, Summit, N. J.

Automotive-Transport Roads Modernize Plant

One of the firms intimately concerned with the building of America's highways now makes use of paved roads to facilitate its own equipment production. The firm is the Marion Power Shovel Co., Marion, Ohio. The roads have been installed as part of its plant rehabilitation and modernization program.

Nearly two miles of paved roadways have been built to connect the various buildings and storage areas at the plant. These roads will be used by a fleet of company-owned trucks, trailers, forklift trucks, and a jeep. These supplement the railroad and overhead-crane facilities which had previously provided transportation at the factory.

Solid Blades Made For Grooving Jobs

Solid grooving-tool blades are now being made by Kennametal, Inc. They are said to have high rigidity to minimize the "weaving" believed to be the cause of rapid tool wear. Standard sizes include ½ x 2½ inches and ¾ x 4 inches. Other sizes can be supplied to order. The blades have a 10-degree angle formed at one end, 2-degree clearance angles on each side, and widths to within 0.0005 inch of the user's specifications.

Interested persons should write Kennametal, Inc., at Latrobe, Pa., for further information. Say you saw this report.

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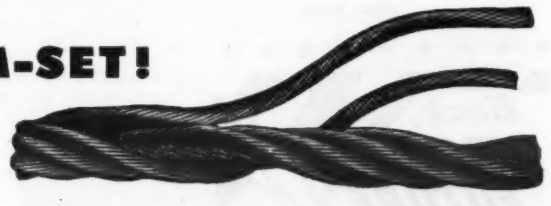

A preformed rope is relaxed, too—relaxed internally, just like the man. But, in the case of the rope, that inner, relaxed effect is permanent. Preforming does it.

Bethlehem Form-Set (preformed) rope is remarkably free of internal stresses. In wire rope language, it is much less susceptible to bending fatigue.

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Loader Speeds Up Heavy Grading Job

Varied Equipment Moves 1,176,465 Yards at Big Post-War Project on New Virginia Highway

✦ VIRGINIA'S No. 1 post-war highway project is construction of the Shirley Memorial Highway. It got off to a fast start this year with the awarding of a 6.9-mile grading contract to the Nello L. Teer Co. of Durham, N. C. Known as one of the South's leading dirt-movers, the Teer organization tackled this job with its usual thoroughness, bringing to the new location a variety of earth-moving equipment to suit all conditions. A feature of the collection is a Euclid loader. When this job was visited in April, only about five such loaders were in use throughout the country. But their results had attracted so much attention that leading earth-moving contractors had already placed orders for fifty more. This loader was filling bottom-dump 20-ton Euclids with 17 loose yards, the equivalent of 12 pay yards, in a shade over half a minute. Such speedy progress resulted in an average of 10,000 to 11,000 yards being moved in a 10-hour day with the combined fleet of Euclids plus tractor-scraper units also in use.

This 6.9-mile contract is composed of four different sections lying within a total stretch of 14.6 miles. This is the ultimate length of the Shirley Memorial Highway, which the Virginia Department of Highways is constructing through Fairfax County. Gaps have been left in the present work for several highway-interchange structures and bridges. These account for the 7.7-mile difference between what is now under construction and the total length of the scheduled project. The structures will be built at a later date under other contracts. The gaps in the grading will also be closed at the same time.

When completed, this part of the Shirley Memorial Highway will connect at the north end with a 2.4-mile section already built by the Public Roads Administration and opened at the end of 1944. The section already completed

C. & E. M. Photo

The Euclid side loader is 46 feet long, is mounted on two crawler treads, and is pulled by a Caterpillar D8.

begins at the network of roads around the Pentagon Building across the Potomac from Washington. It extends through Arlington County, by-passing Alexandria on the west, to the Fairfax County line. It has two 24-foot concrete roadways with a uniform 30-foot grass center strip. Its continuation, the current project, will also eventually have two 24-foot roadways paved with 10-inch uniform reinforced-concrete slabs. And it will have a center strip varying from 14 to 84 feet in width. The new highway, designed as a limited-access expressway, will provide a much-needed route for traffic south of the nation's capital, which now must pass on U. S. 1 through the Alexandria bottleneck. After having by-passed several other communities, the new Shirley Memorial Highway will connect at its southern end with U. S. 1, at the dual steel bridges over Occoquan Creek. This is the dividing line between Fairfax and Prince William Counties. (See C. & E. M., Sept., 1945, pg. 83.)

Land Clearing

Clearing the 126 acres of right-of-way started the middle of November, 1945. For the most part, all four sections consisted of wooded lands, but all four are of varying lengths. The first section, 8,500 feet long, starts at the southern end of the project. An overpass will eventually be constructed there to carry the northbound lane of the new highway over U. S. 1. The

(*Continued on next page*)

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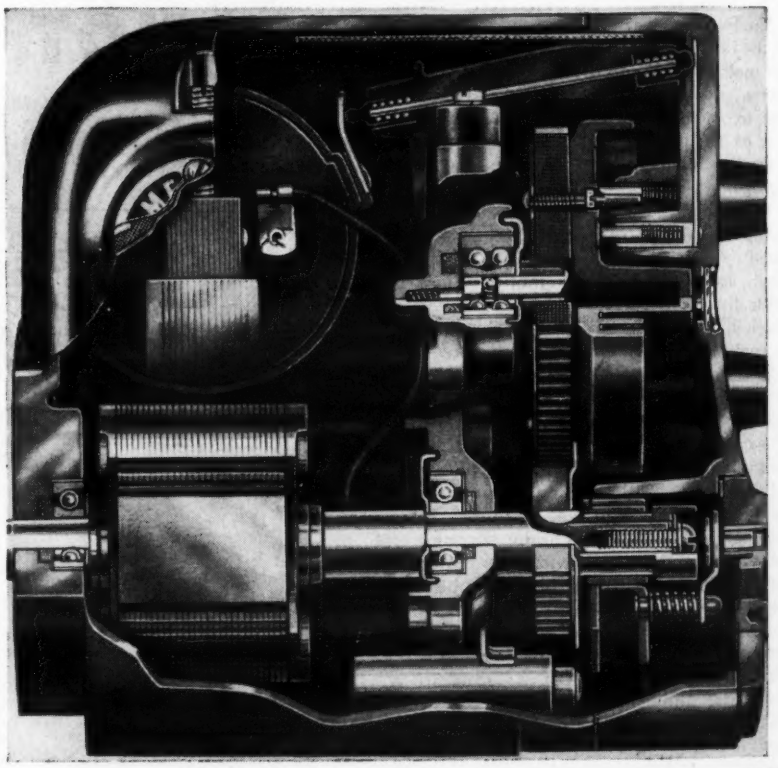

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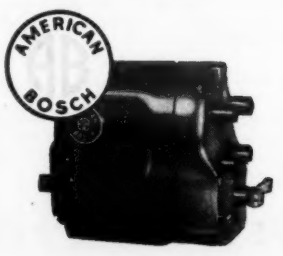

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Loader Speeds Up Heavy Grading Job

(*Continued from preceding page*)

other three sections continue northward, with gaps between for the structure work. They are 16,900, 4,400, and 6,800 feet long. The last section comes within 1,300 feet of State Route 7, where some time in the future an overpass will be built to carry it over the new road.

Five Caterpillar tractor-dozers, four D8's and one D7, were used at various times to push over the trees in the clearing operations. The fallen timber was then dozed roughly to the center line of the right-of-way, which in some areas is 118 feet wide. There it was gathered up in huge piles and burned. It was too small for commercial use as lumber, and the cost of getting it out of the new location would have been high. To pile the timber and brush, the contractor used a Northwest No. 25 crane with a 40-foot boom and an Owen 4-prong rock grapple. The grapple easily engaged the material and moved it to the piles for burning.

Grading

Over the entire job the terrain is heavy and rolling. It requires 50 to 60-foot cuts and fills. No rock outside of a little shale in one location has been encountered. The earth material varies, however, from good to bad. The dirt that is easily excavated and moved is a mixture of gravel, clay, and sand. The troublesome dirt is somewhat like a pipe clay, cracking when dry and swelling when wet. It is a plastic clay with a large shrinkage factor. In between these extremes is a wide variety of material.

Grading started on March 4 when the heavy equipment, which had been given a thorough overhauling during the winter, went into action. For short hauls up to 400 or 500 feet, the contractor uses four LeTourneau 12 to 15-yard scrapers pulled by Caterpillar D8 tractors. The tractor-dozers that were used in clearing are now available for use. They act either as pushers in loading or as levelers, if further leveling is necessary, after the scrapers empty their loads. With these four scraper units, from 3,500 to 4,000 yards are moved in a 10-hour day, depending on the length of haul. On hauls up to 250 feet each scraper usually moves 1,000 yards daily. The contractor chose to work a 10-hour-day 6-day week, despite overtime payments to operators for everything beyond 40 hours.

The material is spread in 8-inch layers and compacted to 95 per cent maximum density. As it contains considerable natural moisture, for the most part, no watering is required. A sight to gladden the eyes of the Highway Department engineers, since it relieved them of compaction worries, was the sheepsfoot-roller equipment which the contractor brought to the job. There are twelve such rollers, each 48 inches long x 41 inches in diameter with 8-inch feet. They were divided into two sets of six rollers each. The set of six in turn were strung out in two rows, tandem style, of three each. A Caterpillar D8 pulls the six-roller unit over the fills. One unit works with the scrapers and the other with the Euclids. Each has no other duty but to roll, so the fills get excellent compaction. The results of using a tractor only for rolling have been much better than they are when a tractor has to "double in brass" and attend to such other duties as pusher loading, unloading, or leveling.

In addition to the sheepsfoot rollers, a Buffalo-Springfield 10-ton 3-wheel roller is used for a final rolling.

Long Hauls

A fleet of 12 bottom-dump Euclids, which haul about 17 loose yards or 12 pay yards, is used for the longer hauls. In one location these have reached a maximum of 4,500 feet, but they average from 700 to 800 feet. On the average hauls these units move from 6,000 to 6,500 yards in a 10-hour day. Credit for this, however, must be given to the rapid performance of the Euclid dirt loader. To enable the loader to throw dirt fast, a LeTourneau Rooter pulled by a D8 tractor first breaks up the ground. The two teeth on the Rooter are 3 feet apart but, by overlapping, furrows are dug 18 inches on centers and about 18 inches deep. The loader works most efficiently when taking a cut from 18 to 20 inches deep and about the same width.

The Euclid side loader used is 46 feet long, including the hitch to the Caterpillar D8 tractor. The tractor only tows the loader, which moves on its own two crawler treads. By hydraulic controls the tractor operator regulates the loader, which is powered by its own Cummins 150-hp diesel engine. This engine also activates the hydraulic hoist. A 9½-foot cutting blade at the front of the loader starts the dirt moving up the 32-foot-long conveyor belt. This conveyor is constructed at an angle. As a result, the trench can be dug directly behind the tractor, and equipment can be loaded while being driven alongside the loader. Thus, excavating and loading are both done with all equipment in motion—the time-saving feature of this unit.

The rubber conveyor belt is 54 inches wide, while the opening between the sides is 48 inches and the channelway is 15 inches deep. Clearance under the chute is 10 feet 3 inches. This affords ample room for the big Euclids or whatever other type of dirt-movers might

(*Continued on next page*)

C. & E. M. Photo

Fill material was compacted by LeTourneau sheepsfoot rollers, in two sets of three each, pulled in tandem by a D8 tractor.

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C. & E. M. Photo
To service equipment on its 6.9-mile grading job, Nello L. Teer Co. used four Ford 1½-ton trucks outfitted as maintenance units. Here the lubrication truck greases a Caterpillar D8 tractor.

Loader Speeds Up Heavy Grading Job

(Continued from preceding page)

be used with the loader. The pulling tractor usually works in second gear.

Time studies taken on these operations disclosed that this side loader filled a 20-ton bottom-dump Euclid with 12 pay yards or 17 loose-measurement yards in from 30 to 40 seconds. Another 10 to 15 seconds was required for one unit to get out of the way and make room for an empty vehicle. The empty unit took a like period of time to get spotted in position and to coordinate its forward movement with that of the loader. Thus the entire loading cycle consumed only about one minute. By loading on the run and dumping on the run, the 12 Euclids keep the loader constantly active. The cuts are taken lengthwise of the roadway in parallel strips about 500 feet long.

Roadway Section

A 6-inch cut is taken under the pavement area for a stabilization course. So care has to be taken as the roadway approaches grade to leave the median strip, averaging 30 feet wide, sufficiently high. The grading section averages 98 feet in width. This includes 10-foot shoulders which have a slope of ½ inch to the foot. From the shoulders the ground slopes 4 to 1 to a 2-foot ditch, which is 2½ feet below the center-line grade of the pavement. The center of the grassed median strip will be depressed 9 inches below the center-line pavement grade.

All cut and fill slopes are 2 to 1. A well dressed appearance is given to these slopes by a Caterpillar No. 12 power grader equipped with a 12-foot blade. This grader also keeps the haul roads smooth, permitting the earth-moving equipment to travel at top speed.

The earth work on each section of the job has balanced. Because of this division into four sections, equipment could be selected for each section to meet the haul requirements. In some areas both types of earth-movers are used. Scrapers are brought in first for the short haul work and then superseded by the rubber-tired units which are used for long hauls.

Drainage work on this contract is light. Only three concrete culverts have to be constructed, in addition to the usual run of concrete pipe. The culverts include an 8 x 10-foot double-barrel reinforced-concrete structure 193 feet long; a 10 x 6-foot structure, 240 feet long; and a 6 x 5-foot structure, 120 feet long. The pipe is used mostly for cross drainage, or from the median strip to the outside limits of the roadway. Also included in this contract is the grading of 6 miles of access roads, 22 to 28 feet wide. These roads will have a gravel surface 12 to 18 feet in width. They will permit cars to get on the limited-access highway at seven different locations in its 14.6-mile length.

Equipment Maintenance

With earth-moving equipment worth about $350,000 in constant use, the contractor provided the facilities to keep it in excellent condition. Four Ford 1½-ton service trucks were outfitted as maintenance units to service the job. One van-like truck contains bins, drawers, compartments, and closets for the storage of special tools and parts for the various units. Another, known as the repair truck, has a 5-ton crane with a 10-foot boom. It holds a Hobart 300-amp electric welder driven by a Hercules engine. Another truck carries an oxyacetylene welding set.

The fourth truck, known as the greasing rig, was outfitted with a 550-gallon tank containing fuel oil for the tractors. Two 50-gallon drums hold diesel motor oil and gasoline respectively. The fuel oil is pumped out by a Jaeger 1½-inch pump, but the oil and gas are drawn off by hand. The greasing unit consists of an air compressor; five reels of hose 50 feet long, through which passes compressed air for the tires; track and gear lubricant; and two hose for chassis lubricant. Different grades of grease are in containers which are mounted on the truck.

For repairs to the tractor tracks, a 25-foot-long support was set up on metal horses. The crawler treads pass along this on their way to a Rodgers portable high-pressure hydraulic press which forces the pins from the tracks. A

(Concluded on next page, Col. 2)

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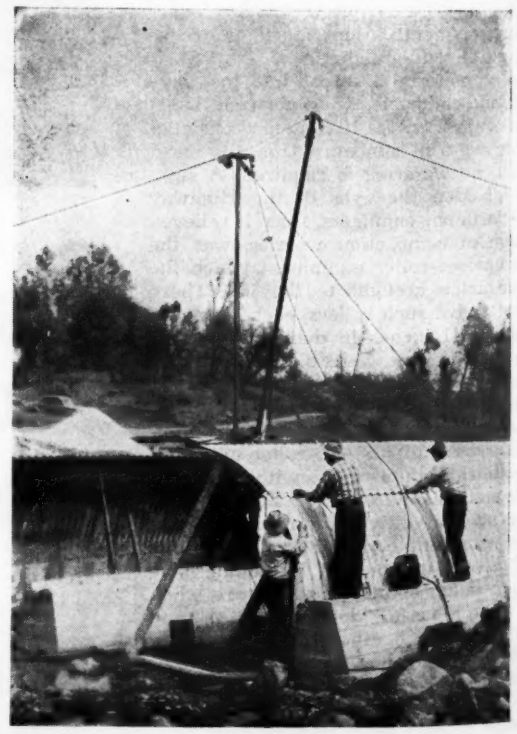

Construction of this twin-arch bridge was simplified and speeded through the use of ARMCO MULTI PLATE. Each arch has a span of 14 feet and is 45 feet long.

Book of Ballads Sings Praises of the Builder

A book of 26 lusty little verses called "Ballads of a Builder" has been written by Basil O'Boyle. He addresses it to men who design and build—with their heads or their hands, in the field or in the office.

Mr. O'Boyle is now a structural consulting engineer, who obviously feels bitter about that shiny-pants office life. He suggests in one jingle that Rameses and King Tut move over and make room for him and his fellows, mere "mummies, with our wrappings cut". It is the field man, and particularly the construction-gang "character", whom Mr. Boyle envies and glorifies. There's the old fellow 68 years old who wouldn't quit working "while the rust ate up [his] gears". There's Pat O'Hara, who once worked on Teddy Roosevelt's ditch. Now he can only belittle every job, its rigs, records, hazards, its deaths —even his own. There's Mike McGee, an Irish drunken bum; but he and his steam rig couldn't be "shtopped" by a rising river when the levee had to be finished.

Mr. O'Boyle has a great fund of such sentimental ditties, even to one about the dog Brown Betty, who was kicked by the boss but who saved his construction gang and camp from fire. Perhaps his best verses are not those about the builder's life, but those about his afterlife—invariably spent in Hell. There's the engineer who can't prove to Hell's gatekeeper that he'll be able to stand the gaff inside. He recounts the hellish places in which he's spent his life, but he doesn't receive his pass until he mentions his five years with the Army Engineers. And in another verse, "To an Old Crew", the author hopes to meet his old bridge gang down there where

> We'll work as we did long ago:
> At the eternal job of repairing
> The main span that crosses the Styx,
> And you'll hear us forever declaring
> There's no bridge in Hell we can't fix.

Mr. O'Boyle expresses himself vehemently on bureaucrats, politicians, and big-shots, who dedicate and take the credit for what the engineer has sweated to build. But some of his views, and half the verses in his book, have nothing to do with construction, unfortunately. But whether or not they are interested in his views on things in general, the author's fellow builders may enjoy reading the thirteen or so ballads about construction men.

The book is published by Bruce Humphries, Inc., 30 Winchester St., Boston, Mass. Price: $2.00.

Lincoln Adds to Staff

Lincoln Electric Co., Cleveland, has announced the return of Garret S. Parsons to the Los Angeles office, as well as the appointment of three new field welding engineers. Mr. Parsons has been with the Army in Japan. The new staff members are: Gordon Appleby, assigned to Philadelphia; Terril S. Hoffman, to St. Louis, Mo.; and E. James Langhurst, to Chicago.

Loader Speeds Up Heavy Grading Job

(Continued from preceding page)

Chicago Pneumatic compressor supplies the unit with the necessary air. The track continues for 10 feet beyond the press to permit the parts to be picked up.

Items and Personnel

The major items included in this $546,600 contract are:

Clearing	126 acres
Excavation	1,176,465 cu. yds.
Concrete for structures	1,171 cu. yds.
Pipe underdrain, 6-inch	1,488 lin. ft.
Concrete pipe, 12 to 60-inch	15,738 lin. ft.
Drop inlets	75 each

The contractor has until December to finish the 6.9 miles of grading. But the progress thus far under Superintendent William R. Burton and his force of about 50 men indicates that work will be completed before that date. The Shirley Memorial Highway is named in honor of the man who headed the Virginia Department of Highways for nineteen years. The Department is now headed by James A. Anderson, Commissioner, with C. S. Mullen as Chief Engineer, and T. F. Loughborough, Construction Engineer. W. F. Smith is Resident Engineer, and E. F. LaPrade is Chief Inspector.

C. & E. M. Photo

Slopes on the Nello L. Teer grading contract were dressed by a Caterpillar No. 12 power grader with a 12-foot blade.

Blades and Cutting Edges

Steels that offer the utmost resistance to impact and abrasion are used in the making of Shunk blades, the manufacturer claims. Shunk makes blades and cutting edges for a wide range of construction and maintenance needs. Typical products of the firm are described in bulletin MD-44, which readers of this magazine can obtain on mention of this notice. Write the Shunk Mfg. Co., Bucyrus, Ohio.

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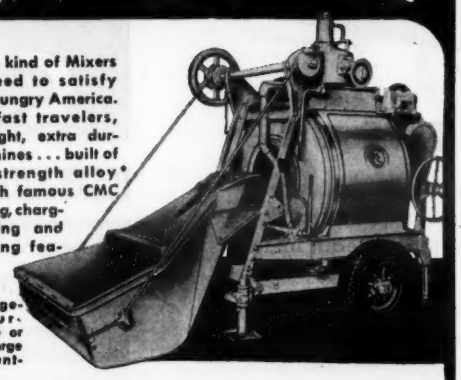

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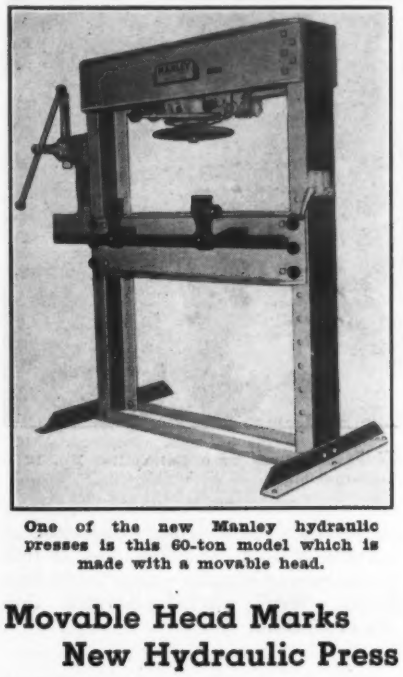

One of the new Manley hydraulic presses is this 60-ton model which is made with a movable head.

Movable Head Marks New Hydraulic Press

Among the new hydraulic presses announced by the Manley Mfg. Division of the American Chain & Cable Co. is a 60-ton model which features a movable head. Applicable for use in highway depots and contractors' shops, this Manley press is said to handle a wide range of jobs with great speed.

The head and pump of the 60-ton Manley are built into one unit which travels back and forth on rollers, while the work remains stationary. A pump handle, located just below the head beam, is adjustable so that the operator can work from a squat, stoop, or any level, the firm says.

The new press can be operated on three speeds, 0 to 15, 15 to 30, and 30 to 60-ton pressures, merely by flipping an indicator knob. The head and pump are enclosed to minimize bending or breaking of flexible tubes or pipes, and a stroke-regulating mechanism is said to prevent the ram from accidentally being forced out of the cylinder. Precautions have been taken for adequate lubrication and protection from dirt.

The work table on this Manley is raised and lowered by a new cable device. Self-locking worm mechanism eliminates pawls and ratchets. A 3-ton mechanical arbor press is built on the side of the new unit so that light jobs can be done although the other press is in action.

The Manley Mfg. Division will be glad to give you more information about this new hydraulic press. Drop the firm a postcard at York, Pa., and mention this news report.

New Pumps Feature Wide Capacity Range

Another addition to its expanding line of hydraulic units has been announced by the John S. Barnes Corp. The new addition, known as the Barnes Equalized Roto-Blade Pump, is available in a number of combinations of single and double pumps, with and without feed or gear pumps.

The new line has pumps ranging in capacities from 8.5 gpm to 50 gpm. They maintain working pressures to 1,000 psi on continuous operation, and 1,500 psi on intermittent usage. Simplified circuit design and greater compactness of space required for a given speed and power are said to feature the new pumps.

Bearing loads are rendered neutral by equalized and diametrically opposed radial hydraulic thrust-loads in these pumps, Barnes reports. The impeller assembly, which includes the bushing and all moving parts, may be readily removed and a new assembly installed, should long wear make it necessary.

Full details and installation drawings for these pumps will be furnished on request. Write the John S. Barnes Corp., 301 So. Water St., Rockford, Ill. Mention CONTRACTORS AND ENGINEERS MONTHLY.

Spike-Driver Hammer Has Built-In Power

An improved model of its gasoline hammer spike driver has been announced by the Syntron Co. Built along the lines of the firm's paving breaker, this hammer has an overall height of only 32 inches, due to a shortened nose-end tool-retaining casting. The spike driver weighs 92 pounds. It is powered by a single-cylinder air-cooled gasoline engine, which burns as fuel gasoline mixed with a small quantity of oil. The entire unit is self-contained.

Full details on this spike driver can be obtained by writing the Syntron Co., 227 Lexington Ave., Homer City, Pa.

Bates Heads PCA Research

The Portland Cement Association has announced that Dr. A. Allan Bates, formerly of the Westinghouse Electric Corp., has been named Vice President for Research and Development. This post has been created to guide study in portland cement, concrete, and their engineering applications. The Association recently voted to set aside a substantial portion of its annual income for this purpose.

Dr. Bates has been Manager of the Chemical, Metallurgical, and Ceramic Research Division of Westinghouse since 1938. He served on two technical intelligence missions during the war.

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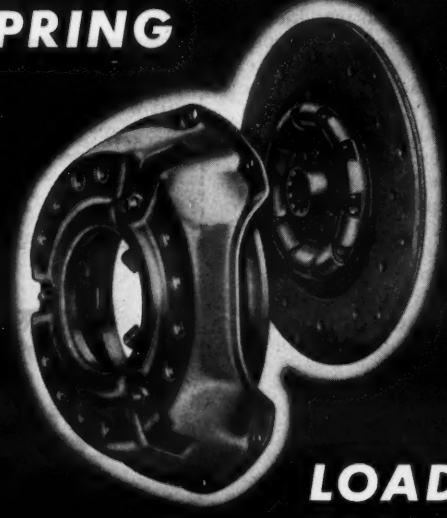
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Erosion Control

(*Continued from page 6*)

and lay at the mercy of future blows. The valuable shellfish industry in the bays has also been imperiled by the shifting sands. The Blue Point oysters, hard and soft-shell clams, and bay scallops would be no more if the shallow shellfish areas of the bay were overrun by the ocean. Parts of the mainland itself would be endangered if the barrier beach gave way.

Joint Legislative Committee

At the 1944 session of the New York State Legislature, due recognition was given to this problem. A ten-man legislative committee, five from the Senate and five from the Assembly, was appointed to study and investigate the problem of checking erosion along the shore line of Long Island, where live 4,000,000 of the state's 13,000,000 citizens. The committee held public hearings and meetings. It secured engineering assistance, made extensive field inspections from Coney Island to the easternmost reaches of Suffolk County, and examined maps, exhibits, records, and data going back many years. In February, 1945, it submitted its report.

With this report went a bill, subsequently enacted into law. It appropriated $1,000,000 for (1) the construction of erosion-arresting public works, and (2) the restoration and protection of lands owned by any municipality or by the state along the Atlantic shore line. The committee recognized that the counties, cities, towns, and villages affected by the erosion could not by themselves cope with its financial and physical problems. Consequently the cost of these improvements on other than state-owned lands is paid for on a 50-50 basis. Half is paid by the state and half by the local community. Thus a total fund of $2,000,000 is set up. This is in line with the state's policy of appropriating funds for flood control. While Long Island does not suffer from floods due to swollen rivers, the effects of ocean-caused erosion are equally severe. State participation in the protection and development of beaches is already a policy in New Jersey and California. The local communities maintain and repair these improvements at their own expense.

Scope of Work

No state action is contemplated at present on any of the three big New York City ocean-front beaches and recreational areas of Coney Island, Jacob Riis Park, and Rockaway Beach. These are under the jurisdiction of the New York City Department of Parks. And the City has additional improvements scheduled for them in its own post-war program.

At Long Beach, rock jetties are under construction to replace or augment the old wood jetties which do not last under the pounding of the surf. The legislative report also advocated the placing of hydraulic fill there to restore lost beach width.

At Point Lookout on the west side of Jones Inlet, the Town of Hempstead has placed and is maintaining rock protection at its own expense until the Federal project for the improvement of the inlet is completed. Additional protection through state and Federal aid is imminent. Federal help is expected through a recently enacted river and harbor bill. It appropriated $1,800,000 for (1) the construction of a mile-long rock breakwater out into the ocean at the east end of Jones Inlet, and (2) the dredging of an entrance channel 12 feet deep from the 12-foot depth in the ocean to the Loop Parkway Bridge in the bay. Half of this expense will be borne by the Federal government. Nassau County, the Town of Hempstead, and the State of New York will split up the remainder.

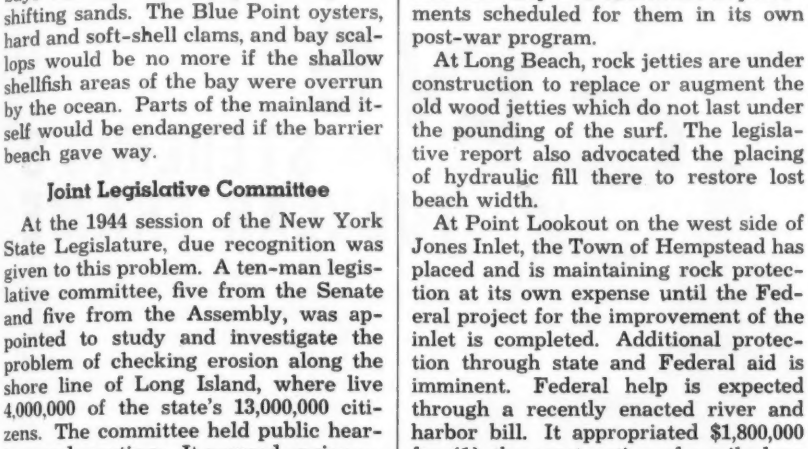
On the Jones Beach peninsula, the dunes which were destroyed in the 1938 and 1944 hurricanes and by other severe storms are being restored by a process of "artificial nourishment". That is, dredges are pumping sand from the bay for placement in a hydraulic fill along the ocean front. On the 20-mile front between Jones and Fire Island Inlets, pipe-line dredges are working to build up to their former level such picturesque beaches as Gilgo and Cedar Island, among others.

Just completed is the newly dredged channel at Fire Island Inlet, which had been virtually closed to navigation because of sand bars. The material from these inside bars was removed by dredging and deposited along the Oak Beach shore line. This had eroded in recent years to the very doors of many cottages and homes. The new fill now provides a 100-foot beach in front of these once-imperiled buildings.

Along the 50-mile barrier reef from Fire Island Inlet eastward to Shinnecock Inlet and connecting to Southampton a few miles beyond, the committee suggested that hydraulic fill be placed to carry a 20-foot roadway at an elevation of 15.0. Only by laying such a "backbone"—a boulevard on a hydraulic fill—can the island beach be protected from inundation during storms. Too, it can be made accessible by car, whereas now it can be reached only by boat. Material for the fill is available in abundance. It needs only to be pumped from the bay a few hundred feet to where it can be discharged to form an embankment with flat 1 on 28 slopes. The total bay length protected by these dune-covered reefs is about 100 miles with an average width of 5 miles. Of this vast area only about 10 per cent is navigable; the rest of the water is filled with islands and shoals. The plan is to dredge a boat channel 200 feet wide x 15 feet deep in the bay not far from the reef, and to use that material for the roadway fill. Planted beach grass will help stabilize the sand embankment.

Moriches Inlet, just west of Westhampton Beach, was opened up in a great storm of 1931. But since then it has shoaled over to a considerable degree. The same is true of Shinnecock Inlet. It was formed when the 1938 hurricane-driven waters broke through the beach, which at its maximum is only

(*Concluded on next page, Col. 2*)



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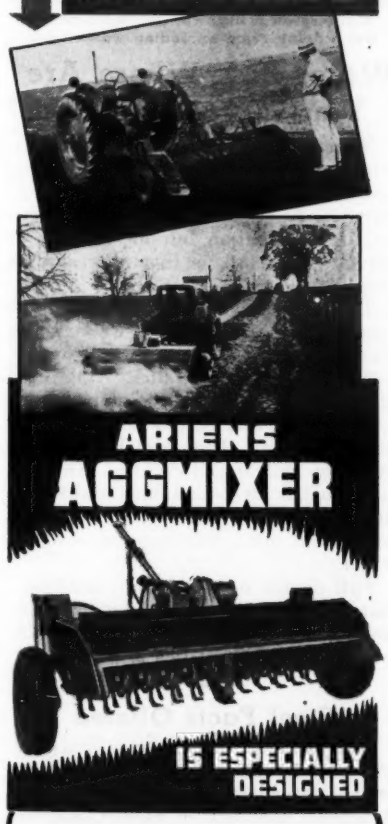

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CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue
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Workers on a highway paving contract get a drink from an Indian water tank.

Water Boy, Where Are You Wandering Now?

Water is always a problem in contracting. If it isn't rain that holds up work, it's the seepage that must be removed. Another water problem peculiar to construction, but one that can be solved with ease, is that of providing drinking water.

The Indian water and supply tank made by D. B. Smith & Co. enables workmen to have clean, cool water, even at remote work sites. Holding 5 gallons, the tank has shoulder straps for carrying, and both a pouring spout and a faucet. This portable tank is built of galvanized Armco Zincgrip steel, and is air-conditioned and form-fitting. It can be used for carrying hot coffee and other beverages as well as water.

Full details on the Indian drinking-water tanks can be obtained by mentioning this notice. Write D. B. Smith & Co. at Main St., Utica 2, N.Y.

Steel Facts Offered

Users of steel for structural purposes will be interested in an 8-page bulletin which describes the activities of the American Institute of Steel Construction. Included in the information given is a wide list of publications, most of them free of charge, to engineers and contractors.

You can obtain this descriptive folder on AISC activities by writing the Institute at 101 Park Ave., New York 17, N. Y. Mention this notice.

Erosion Control

(*Continued from preceding page*)

1,000 feet wide, and joined the bay and the ocean by a new passage.

Studies by the Army Engineers for the stabilization of these inlets are in a Federal river and harbor bill and are not currently part of the state work. The final feature discussed in the report —the building of a seawall around the lighthouse at Montauk Point—is also to be an all-Federal project.

Personnel

New York State's 50 per cent share in the work is financed from the State's post-war reconstruction fund, accumulated from surplus revenues during the war years. As a result the work got under way quickly and smoothly this spring at the locations which were most in need of immediate attention: Fire Island Inlet dredging and the Oak Beach protection; Long Beach jetty construction; the Jones Beach peninsula stabilization at Gilgo and Cedar Island beaches; and dune restoration west of Southampton beach. The other projects recommended are awaiting approval.

Heading the Joint Legislative Committee as Chairman was Senator Perry B. Duryea. Harry T. Tuthill and Harrison Weber were Consulting Engineers to the Committee. It was also advised by Sidney Shapiro, Deputy Chief Engineer of the Long Island State Park Commission, and a leading authority on beach protection and hydraulic fills. The construction is shared by the New York State Department of Public Works, Charles H. Sells, Superintendent, with J. J. Darcy, District Engineer of District 10, which covers all of Long Island, and by the Long Island State Park Commission, of which Robert Moses is President, and A. E. Howland is Chief Engineer.

Williams Joins CSPA

The appointment of Frank M. Williams as its District Engineer representing Ohio has been announced by the Clay Sewer Pipe Association. With the Ohio Department of Highways since 1923, Mr. Williams also saw duty with the U. S. Army Signal Corps on Okinawa. He will have his office at CSPA headquarters in the Huntington Bank Bldg., Columbus 15.

Hydraulic Plow Control

An improved power hydraulic control for snow plows has been announced by the Monarch Road Machinery Co. The unit puts the engine of the truck or tractor to work, not the driver's muscles, Monarch says.

Operated by the fan belt, the Hy-Lo-Jack is designed to give fast finger-tip control. Other features of the unit are detailed in an illustrated folder issued by Monarch. Interested highway engineers can obtain copies of the bulletin by writing to the firm at 327 Front Ave., N.W., Grand Rapids 4, Mich. Say you saw this notice in CONTRACTORS AND ENGINEERS MONTHLY.

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In Sterling's All-Steel Wheelbarrow with Tubular Frame, you get the most barrow for your money. Cost-saving features include: steel tray with lapped corners — All welded construction, no rivets — Steel reinforcing rod around top edge — V front braces and cross supports — All parts securely anchored to the sturdy one-piece steel tube. Truly a barrow that withstands hard usage over a long period of time. Be sure to specify STERLING on your next barrow order. Delivery will be as prompt as conditions permit.

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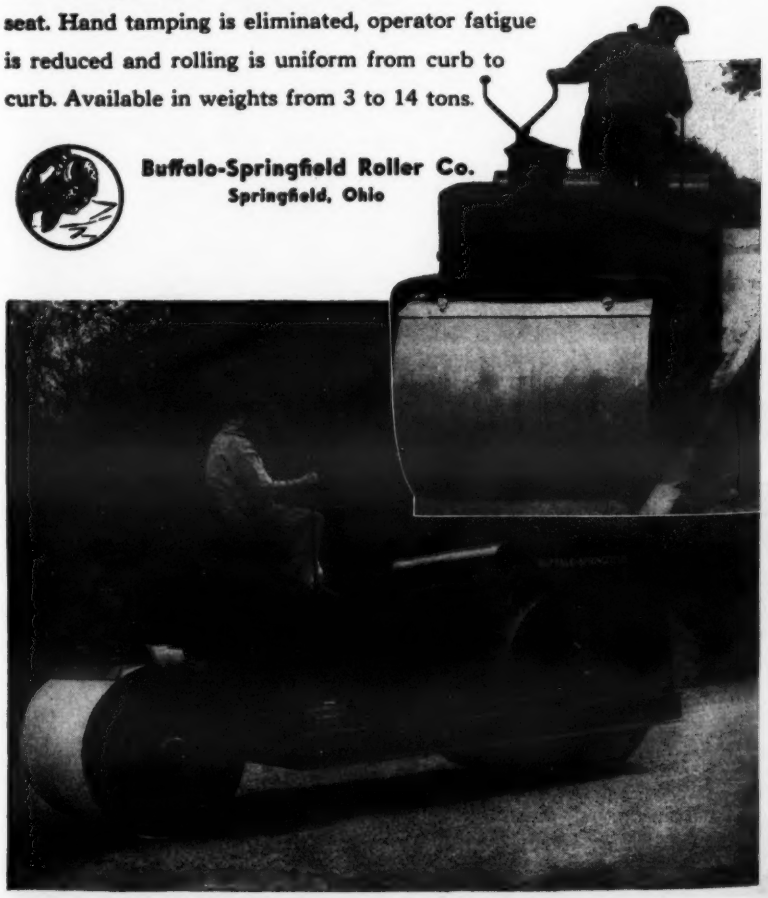

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One-Man-Portable Light-Duty Conveyor

A conveyor, light enough to be carried about the job by one man, has been announced by the Material Movement Industries of Chicago. The firm, formerly known as the Coaltoter Conveyor Co., calls the unit the Tote-All Zephyr.

Made of a special alloy steel, the conveyor is said to be resistant to corrosion and abrasion. It is built in 12 and 16-foot sizes. Each unit has an 8-inch belt. An adjustable mounting holds the gasoline engine above the conveyor. If preferred, an electric motor can be used, or the conveyor can be furnished without a power unit.

Full details and specifications are available. Write the Material Movement Industries, 310 So. Michigan Ave., Chicago 4, Ill. Say you saw this notice.

Hydraulic Drills Shown

Hardsocg horizontal and vertical hydraulic drills for quarry and other rock work are described in a new folder. The horizontal unit is said to have drilled a hole 174 feet long in 1¼ hours—believed to be the longest horizontal hole for stripping ever recorded. The Hardsocg vertical drill has shown an on-the-job production of 110 holes, each 10 feet deep, in one day, it is reported.

The illustrated leaflet can be obtained from Amereco, Inc., Greensburg, Pa., sole manufacturer's agent of these drills. Just mention this notice in CONTRACTORS AND ENGINEERS MONTHLY.

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